

Identification Record

Please record the following information:

The serial numbers are the manufacturer's keys to numerous engineering details that apply to your Cummins MerCruiser Diesel product. When contacting Cummins MerCruiser Diesel (CMD) about service, always specify model and serial numbers.



Drive serial number locations

a - Transmission serial number plate

b - Drive serial number decal and stamping

Refer to the engine operation and maintenance manual available from the engine manufacturer for the location of the engine data tag, which contains the engine serial number and model number.

Please record the following information:		
Drive Serial Numbers	Zeus Drive Serial Number	Transmission Serial Number
Port		
Starboard		
Engine Model and Horsepower	Engine Serial Number	
/	Port	
	Starboard	
Propeller Information	Propeller Part Number	Pitch
Front	-	
Rear	-	
Boat Hull Identification Number (HIN)		Purchase Date
		/
Boat Manufacturer	Boat Model	Boat Length
Exhaust Gas Emissions Certificate Number (Europe Only)		
/		

The description and specifications contained herein were in effect at the time this guide was approved for printing. CMD, whose policies are based on continuous improvement, reserves the right to discontinue models at any time or to change specifications or designs without notice and without incurring obligation.

Mercury Marine, Fond du Lac, Wisconsin, U.S.A. Printed in U.S.A.

©2007, Mercury Marine

Mercury, Mercury Marine, MerCruiser, Mercury MerCruiser, Mercury Racing, Mercury Precision Parts, Mercury Propellers, Mariner, Quicksilver, #1 On The Water, Alpha, Bravo, Pro Max, OptiMax, Sport-Jet, K-Planes, MerCathode, RideGuide, SmartCraft, Zero Effort, M with Waves logo, Mercury with Waves logo, and SmartCraft logo are all registered trademarks of Brunswick Corporation. Mercury Product Protection logo is a registered service mark of Brunswick Corporation.

Welcome

You have selected one of the finest marine power packages available. It incorporates numerous design features to ensure operating ease and durability.

With proper care and maintenance, you will thoroughly enjoy using this product for many boating seasons. To ensure maximum performance and carefree use, we ask that you thoroughly read this manual, which contains specific instructions for using and maintaining your product. We suggest that this manual remain with the product for reference whenever you are on the water.

Thank you for purchasing one of our Cummins MerCruiser Diesel products. We sincerely hope your boating will be pleasant.

Cummins MerCruiser Diesel

Warranty Message

The product you have purchased comes with a **limited warranty** from Cummins MerCruiser Diesel; the terms of the warranty are set forth in the Warranty Sections of this manual. The warranty statement contains a description of what is covered, what is not covered, the duration of coverage, how to best obtain warranty coverage, **important disclaimers and limitations of damages**, and other related information. Please review this important information.

Read This Manual Thoroughly

IMPORTANT: If you do not understand any portion of this manual, contact your dealer for a demonstration of the actual starting and operating procedures.

Notice

Throughout this publication, and on your power package, dangers, warnings, cautions, and notices, accompanied by the International Hazard Symbol , may be used to alert the installer and user to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. These safety alerts follow ANSI standard Z535.6-2006 for product safety information in product manuals, instructions, and other collateral materials. **Observe them carefully.**

These Safety Alerts alone cannot eliminate the hazards that they signal. Strict compliance with these special instructions while performing the service, plus common sense operation, are major accident prevention measures.

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

 CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, could result in engine or major component failure.

IMPORTANT: Identifies information essential to the successful completion of the task.

***NOTE:** Indicates information that helps in the understanding of a particular step or action.*

 WARNING

The operator (driver) is responsible for the correct and safe operation of the boat, the equipment aboard and the safety of all occupants aboard. We strongly recommend that the operator read this Operation, Maintenance and Warranty Manual and thoroughly understand the operational instructions for the power package and all related accessories before the boat is used.

 WARNING

The engine exhaust from this product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

TABLE OF CONTENTS

Section 1 - Limited Warranty

Warranty Information.....	2	Limited Warranty Coverage.....	3
Warranty Registration—United States and Canada.....	2	Zeus Drive Limited Warranty Against Corrosion (Worldwide).....	7
Warranty Registration—Outside the United States and Canada.....	2	Emission Warranty.....	8
		Transfer Of Warranty.....	8

Section 2 - Getting to Know Your Power Package

General Information.....	12	Dual-Handle Electronic Remote Control (ERC) with DTS Trackpad Features and Operation..	15
Models Covered.....	12	Operation.....	15
Drive Serial Number and Decal Placement...	12	Basic Joystick Operation.....	17
Features and Controls.....	12	Electrical System Overload Protection.....	17
Emergency Stop (E-Stop) Switch.....	12	Vessel Interface Panel (VIP) Overload Protection.....	18
Instrumentation.....	13	Overload Protection for Other Circuits.....	18
VesselView.....	13	Zeus Drive Alignment.....	18
Digital Gauges (If Equipped).....	13		
Analog Gauges (If Equipped).....	14		
Electronic Helm Steering.....	15		

Section 3 - On The Water

Safe Boating Suggestions.....	20	Starting and Stopping the Engines.....	27
Be Alert To Carbon Monoxide Poisoning.....	21	Normal Starting.....	27
Good Ventilation.....	21	Normal Stopping.....	28
Poor Ventilation	22	Starting the Engines—Manual Override.....	28
Basic Boat Operation.....	22	Stopping the Engines—Manual Override.....	30
Freezing Temperature and Cold Weather Operation.....	22	Traditional Maneuvering with Steering and Thrust.....	30
Drain Plug and Bilge Pump.....	23	To Maneuver the Boat in Forward.....	31
Protecting People in the Water.....	23	To Steer the Boat in Tight Turns at Low Speeds.....	31
While the Boat is Moving.....	23	To Spin the Boat on its Axis at Low Speeds	31
While the Boat is Stationary.....	23	Maneuvering with the Joystick.....	31
Wave and Wake Jumping.....	24	Trim Tab Override.....	35
Impact with Underwater Hazards.....	24	Manual Adjustment.....	35
Zeus Drive Impact Protection.....	25	Trim Tab Override Use.....	36
Conditions Affecting Boat Operation.....	25	Getting on Plane.....	36
Weight Distribution (Passengers and Gear) Inside the Boat.....	25	Smoothing the Ride.....	36
Bottom Of Boat.....	26	Correcting a List.....	36
Cavitation.....	26	Low Speed Trim.....	36
Ventilation.....	26		
Propeller Selection.....	26		
Getting Started.....	27		
Break-In Period (New or With Replacement Gears).....	27		

Special Digital Throttle and Shift (DTS)		Disengage Auto Heading.....	49
Features.....	37	To Resume to a Heading	50
Troll and Throttle Response.....	38	Track Waypoint.....	51
Dock.....	39	Engaging Track Waypoint Mode.....	52
Throttle Only.....	39	Disengaging Track Waypoint Mode.....	53
1 (One) Lever.....	40	Turn Button or Joystick in Track Mode.....	53
Sync.....	40	Auto Heading Button in Track Mode	53
Cruise Control.....	41	Acknowledging a Turn During a Waypoint	
Precision Pilot Track Pad Features.....	41	Arrival.....	54
General Information.....	41	Waypoint Sequence.....	55
Standby.....	42	Waypoint Acknowledge	56
Standby and Active Lights.....	43	Response Button.....	58
Power Icon.....	43	Changing VesselView Mode Display	
Skyhook.....	44	Times.....	58
Skyhook Screen Notes.....	45	End of First Season Checkup.....	58
Engaging Skyhook.....	46	Contingent Operations.....	59
Disengaging Skyhook.....	46	Backup Steering System.....	59
Turn Buttons.....	47	Port Engine Only Operation.....	59
Auto Heading.....	48	Gear Engagement—Emergency Procedure.	59

Section 4 - Specifications

Drive Gear Lubricant.....	62	Approved Paints.....	62
Transmission.....	62	Approved Lubricants.....	62
Steering Actuator and Trim Fluid.....	62		

Section 5 - Maintenance

Product Responsibilities.....	66	Changing.....	80
Owner and Operator Responsibilities.....	66	Transmission Fluid.....	81
Dealer Responsibilities.....	66	Checking.....	81
Do-It-Yourself Maintenance Suggestions.....	66	Filling.....	82
Inspection.....	67	Changing.....	83
Drive Cover.....	67	Seawater Strainer.....	86
Removing the Drive Cover.....	67	Battery.....	87
Cleaning and Inspecting the Drive Cover.....	68	Gauges.....	87
Installing the Drive Cover.....	68	Checking Gauges.....	87
Maintenance Schedules.....	69	Cleaning Gauges.....	87
Application.....	69	Electrical System.....	87
Routine Maintenance.....	69	Cooling System and Exhaust System.....	87
Scheduled Maintenance.....	69	Lubrication.....	88
Maintenance Log.....	70	Driveshaft Slip-Joint	88
Drive Gear Lube.....	72	Seacock—Seawater Return (Overboard).....	89
Checking.....	72	Propeller Shaft.....	90
Filling.....	73	Corrosion Protection.....	90
Changing.....	74	Anodes and MerCathode System	90
With the Boat in the Water.....	74	Reference Electrode Wire of the MerCathode	
With the Boat Out of the Water.....	77	System.....	91
Steering Actuator and Trim Fluid.....	79	MerCathode Anode.....	92
Checking.....	79	Checking.....	92
Filling.....	80	Replacing.....	92

MerCathode System Testing.....	92	Painting the Boat.....	94
Trim Tab Anodes.....	93	Propellers.....	95
Checking.....	93	Propeller Removal.....	95
Replacing.....	93	Propeller Repair.....	97
Continuity Circuits.....	93	Propeller Installation.....	97
Inhibiting Corrosion.....	94		

Section 6 - Storage

Cold Weather (Freezing Temperature) Storage and Seasonal Storage.....	102	Battery Storage.....	103
Storage Descriptions.....	102	Recommissioning.....	103
Preparing the Power Package for Storage.....	102	Engine.....	103
Drive Storage.....	102	Drive.....	103
Engine Storage.....	103	Power Package.....	103

Section 7 - Troubleshooting

Diagnosing Electronically Controlled Fuel System Problems.....	106	Joystick.....	107
Electrical Connections.....	106	Electronic Remote Controls.....	107
Troubleshooting Charts.....	106	Steering System.....	108
Troubleshooting Engine Related Problems.....	106	Trim Tabs.....	109
Check VesselView First.....	106	Boat Response Changes.....	109
Poor Performance.....	107	Battery Will Not Charge.....	109
		Gauges and Instrumentation.....	110

Section 8 - Customer Assistance Information

Owner Service Assistance.....	112	Muut kieleet.....	114
Local Repair Service.....	112	Autres langues.....	114
Service Away From Home.....	112	Andere Sprachen.....	114
Stolen Power Package.....	112	Altre lingue.....	114
Attention Required After Submersion.....	112	Andre språk.....	114
Replacement Service Parts.....	112	Outros Idiomas.....	114
Parts and Accessories Inquiries.....	113	Otros idiomas.....	115
Resolving a Problem.....	113	Andra språk.....	115
Customer Service Literature.....	113	Allej gļpssej.....	115
English Language.....	113	Ordering Literature.....	115
Other Languages.....	114	United States and Canada.....	115
Andre sprog.....	114	Outside The United States and Canada.....	115
Andere talen.....	114		

Section 1 - Limited Warranty

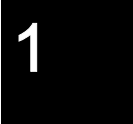


Table of Contents

Warranty Information.....	2	Limited Warranty Coverage.....	3
Warranty Registration—United States and		Zeus Drive Limited Warranty Against Corrosion	
Canada.....	2	(Worldwide).....	7
Warranty Registration—Outside the United		Emission Warranty.....	8
States and Canada.....	2	Transfer Of Warranty.....	8

Warranty Information

Warranty Registration—United States and Canada

The CMD warranty registration center will coordinate warranty registration for both CMD/Cummins and Mercury Marine products, only one Warranty Registration Form is required to be filed for each engine/drive system.

1. To ensure that your warranty coverage begins promptly, your selling dealer should fill out the Warranty Registration Card completely and mail it to the factory immediately upon sale of the new product.
2. The Warranty Registration Card identifies the name and address of the original purchaser, product model and serial number(s), date of sale, type of use and selling dealer's code, name, and address. The dealer also certifies that you are the original purchaser and user of the product. A temporary Owner Warranty Registration Card will be presented to you when you purchase the product.
3. Upon receipt of the Warranty Registration Card at the factory, you will be sent an owner resource guide that includes your warranty registration confirmation. If you do not receive your owner resource guide within 60 days from date of new product sale, please contact your selling dealer.
4. Because of your selling dealer's ongoing interest in your satisfaction, the product should be returned to him for warranty service.
5. The product warranty is not effective until the product is registered at the factory.

NOTE: Registration lists must be maintained by the factory and dealer on marine products sold in the United States in the event that a safety recall notification under the Federal Boat Safety Act is required.

6. You may change your registration address at any time, including at time of warranty claim, by calling CMD or sending a letter or fax with your name, old address, new address, and engine serial number to CMD's warranty registration department. Your dealer can also process this change of information.

United States customers or dealers may contact:

Cummins MerCruiser Diesel LLC, Inc.
Attn: Warranty Registration Department
4500 Leeds Avenue - Suite 301
Charleston, South Carolina 29405
1-800-668-0407
Fax Fax 843-745-1616

Warranty Registration—Outside the United States and Canada

1. It is important that your selling dealer fills out the Warranty Registration Card completely and mails it to the Cummins MerCruiser Diesel Distributor or Cummins MerCruiser Diesel Authorized Dealer responsible for administering the warranty registration and claim program for your area.
2. The Warranty Registration Card identifies your name and address, product model and serial numbers, date of sale, type of use and the selling distributor's and dealer's code number, name and address. The distributor or dealer also certifies that you are the original purchaser and user of the product.

3. A copy of the Warranty Registration Card, designated as the Purchaser's Copy, MUST be given to you immediately after the card has been completely filled out by the selling distributor or dealer. This card represents your factory registration identification, and should be retained by you for future use when required. Should you ever require warranty service on this product, your dealer may ask you for the Warranty Registration Card to verify date of purchase and to use the information on the card to prepare the warranty claim forms.
4. In some countries, the Cummins MerCruiser Diesel Distributor or Cummins MerCruiser Diesel Authorized Dealer will receive the Factory Copy of the Warranty Registration Card from your distributor or dealer. If you receive a plastic Warranty Registration Card, you may discard the Purchaser's Copy that you received from the distributor or dealer when you purchased the product. Ask your distributor or dealer if this plastic card program applies to you. Center will issue you a permanent (plastic) Warranty Registration Card within 30 days after
5. For further information concerning the Warranty Registration Card and its relationship to Warranty Claim processing, refer to the International Warranty. See Table of Contents. IMPORTANT: Registration lists must be maintained by the factory and dealer in some countries by law. It is our desire to have ALL products registered at the factory should it ever be necessary to contact you. Make sure your Cummins MerCruiser Diesel Distributor or Cummins MerCruiser Diesel Authorized Dealer fills out the warranty registration card immediately and sends the factory copy to the Marine Power International Service Center for your area.

Limited Warranty Coverage

Engines and Drive Systems Included in this Coverage

Marine Propulsion

Zeus 3500

Zeus 3800

Products Warranted

This limited warranty applies to new Engines and Drive Systems sold by Cummins MerCruiser Diesel LLC. Inc., herein after "CMD", that are branded as Cummins MerCruiser Diesel products and used in Marine applications anywhere in the world where CMD approved service is available¹ and delivered to the first user on or after September 1, 2007. This limited warranty excludes all Engines branded and sold as Cummins Marine Diesel products. The 'Product' consists of a new CMD Engine and Drive System, as well as accessories, which are approved and supplied by CMD and Cummins, and which are either installed by CMD or a CMD authorized distributor. These Products have the following designation:

High Output Rating

Intended for use in variable load applications where full power is limited to one hour out of every eight hours of operation. Reduced power must be at or below 200 RPM of the maximum RPM. This power rating is for pleasure craft applications that operate less than 500 hours per year.

Base Engine and Drive Limited Warranty

This limited warranty covers any failures of the Product, under normal use and service, which result from a defect in CMD material or factory workmanship (Warrantable Failure) Underwater impact damage is not a warrantable failure. Coverage begins with the retail sale of the Engine and Drive by CMD and continues for the Duration stated in the following table. The Duration commences on either the date of delivery of the Product to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 125 hours, whichever occurs first. Commercial use of this product voids the warranty. Commercial use is defined as any work or employment related use of the product, or any use of the product which generates income, for any part of the warranty period, even if the product is only occasionally used for such purposes.

1. Locations in the United States and Canada are listed in the Cummins United States and Canada Sales and Service Directory; other locations are listed in the Cummins International Sales and Service Directory.

Two Year Limited Warranty—Limited Warranty Coverage

Coverage Category	Coverage Duration (whichever occurs first)		Repair Charge Paid by CMD			
	Months	Hours	Parts	Labor	Removal and Installation Labor	Travel
Base Engine Warranty	24	1000	Yes	Yes	Yes	Yes
Extended Major Components	72	3000	Yes	Yes	Yes	Yes

Extended Major Components Limited Warranty

The Extended Major Components Limited Warranty provision is concurrent with the Base Engine and Drive Limited Warranty and continues beyond the expiration of the Base Engine and Drive Limited Warranty for an additional four years or 2000 hours whichever occurs first. The Extended Major Components Limited Warranty covers Warrantable Failures of the following Engine and Drive parts or castings (Covered parts):

Engine:

Engine Cylinder Block and Head Casting
 Engine Camshaft and Crankshaft Forging
 Engine Connecting Rod Forging
 Engine Gear Train Gears:

- Crankshaft Gear
- Camshaft and Camshaft Idler Gear
- Accessory Drive Gear
- Fuel Pump Gear

Engine Gear Cover Casting
 Flywheel Housing Casting

Bushing and bearing failures are NOT covered.

Drive:

Marine Gear Housing
 Marine Gear Drop Box Housing
 Steering Actuator Housing Casting
 Drive Mid-section Casting
 Lower Gear Housing Casting – (Underwater Impact Damage Excluded)
 Trim Tab Casting – (Underwater Impact Damage Excluded)
 Bearing Carrier Casting – (Underwater Impact Damage Excluded)
 Drive Shaft – (Less U-joints)
 Intermediate Shaft – (Underwater Impact Damage Excluded)
 Clamp Rings
 Steering and Trim Oil Tank
 Skeg – (Underwater Impact Damage Excluded)

Consumer Products

The warranty on Consumer Products in the United States is a limited warranty. **CMD IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Any implied warranties applicable to Consumer Products terminate concurrently with the expiration of the express warranties applicable to the Product. In the United States, some states do not allow the exclusion of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the limitations or exclusions herein may not apply to you.

These warranties are made to all Owners in the chain of distribution and Coverage continues to all subsequent Owners until the end of the periods of Coverage.

CMD Responsibilities

During the Base Engine Limited Warranty

CMD will pay for all parts and labor needed to repair the damage to the Product resulting from a Warrantable Failure when performed during normal business hours. All labor costs will be paid in accordance with Cummins and Mercury Marine's published Standard Repair Time guidelines. When it is necessary for mechanics to make on-site warranty repairs, CMD will pay reasonable travel expenses, including meals, mileage and lodging, for mechanics to travel to and from the repair dock.

CMD will pay for the lubricating oil, antifreeze, filter elements, and other maintenance items that are not reusable due to the Warrantable Failure.

CMD will pay for reasonable labor costs for Engine and Drive System removal and reinstallation when necessary to repair a Warrantable Failure.

During the Extended Major Components Limited Warranty

CMD will pay for parts and labor for the repair or, at its option, the replacement of the defective covered part and any covered part damaged by a warrantable failure of the defective covered part.

Owner Responsibilities

During Both the Base Engine and Drive System and the Extended Major Components Limited Warranties

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements, and other maintenance items replaced during warranty repairs unless such items are not reusable due to the Warrantable Failure.

During the Extended Major Components Limited Warranties

Owner is responsible for the cost of all parts and labor required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner is responsible for the operation and maintenance of the Product as specified in the applicable Cummins, MerCruiser, or CMD Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Exceeding the operational parameters of the HO rating will void this warranty. The owner of the boat is ultimately responsible for ensuring the engine and drive system is properly operated and maintained. The warranty will be void on any Engines and Drives that are misapplied, not maintained properly or misused.

Before the expiration of the applicable warranty, Owner must notify a CMD distributor, authorized dealer, or other repair location approved by CMD of any Warrantable Failure and make the Engine and Drive System available for repair by such facility. Locations in the United States and Canada are listed in the Cummins U.S. and Canada Sales and Service Directory; other locations are listed in the Cummins International Sales and Service Directory.

In the event of any Product failure, Owner is responsible for the cost of towing the boat to the repair dock and for all associated docking, storage, and harbor charges.

Owner is responsible for communication expenses, meals, lodging, and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for maintaining the Engine hour meter in good working order at all times and to ensure that the hour meter accurately reflects the total hours of operation of the Product.

Owner is responsible for the costs to investigate complaints, unless the problem is caused by a defect in CMD material or factory workmanship.

Owner is responsible for non-Engine and non-Drive System repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs, and other losses resulting from a Warrantable Failure.

Limitations

Section 1 - Limited Warranty

CMD is not responsible for failures or damage resulting from what CMD determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; over-fueling; over-speed; lack of system maintenance to the engine and drive; improper storage, starting, warm-up, run-in or shutdown practices, corrosion of Engine or Drive due to lack of maintenance; unauthorized modifications to the Engine or Drive. CMD is also not responsible for failures caused by incorrect oil or fuel or by water, dirt or other contaminants in the fuel or oil.

CMD is not responsible for failure resulting from:

1. Use or application of the Product inconsistent with its rating designation set forth above.
2. Incorrect installation.
3. Engines that do not reach rated RPM because of issues unrelated to the engine (for example, overloading the vessel, selecting an engine with insufficient horsepower for the vessel, improper gear and/or propeller selection, inadequate hull maintenance, etc.).
4. Use of improper propellers.
5. The lack of completing published maintenance procedures.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that oil consumption exceeds CMD published standards.

CMD does not warrant accessories or parts that are not supplied by Cummins/Mercury Marine Factory.

CMD is not responsible for failures of maintenance Components supplied by Cummins/Mercury Marine beyond 90 days After the coverage duration start date. Maintenance Components include, but are not limited to: sea water pump impellers; zinc plugs; oil filters; fuel filters; air filters; water filters; and fuel/water separator filters. Except for the accessories noted previously, CMD does not warrant accessories which bear the name of another company.

Parts used in warranty repairs may be new Cummins/Mercury Marine parts, or Cummins / Mercury Marine-approved rebuilt or repaired parts. CMD is Not responsible for failures resulting from the use of Parts not supplied by Cummins/Mercury Marine.

A new Cummins/Mercury Marine part or Cummins / Mercury Marine-approved rebuilt part used to replace a Warranted Part assumes the identity of the Warranted Part it replaced and is entitled to the remaining coverage hereunder.

CMD DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.

CMD IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CMD IN REGARD TO THESE ENGINES. CMD MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

In the United States² and Canada, this warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Outside the United States³ and Canada, in case of consumer sales, in some countries the Owner has statutory rights which cannot be affected or limited by the terms of this warranty.

Nothing in this warranty excludes or restricts any contractual rights the Owner may have against third parties.

2. United States includes American Samoa, the Commonwealth of Northern Mariana Island, Guam, Puerto Rico and the U.S. Virgin Islands.

3. United States includes American Samoa, the Commonwealth of Northern Mariana Island, Guam, Puerto Rico and the U.S. Virgin Islands.

Zeus Drive Limited Warranty Against Corrosion (Worldwide)

What Is Covered

Cummins MerCruiser Diesel warrants the Zeus Drive (Product) will not be rendered inoperative as a direct result of corrosion for the period of time described below.

Duration of Coverage

This limited corrosion warranty provides coverage for three (3) years / 1500 Hours from either the date the product is first sold, or the date on which the product is first put into service, whichever occurs first. The repair and replacement of parts, or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date. Unexpired warranty coverage can be transferred to subsequent purchaser upon proper reregistration of the product. Warranty coverage is terminated for used product repossessed from a retail customer, purchased at auction, from a salvage yard, or from an insurance company that obtained the product as a result of an insurance claim.

Conditions That Must Be Met to Obtain Warranty Coverage

Corrosion prevention devices specified in the Operation, Maintenance, and Warranty manual must be in use on the boat, and routine maintenance outlined in the Operation, Maintenance, and Warranty manual must be timely performed (including without limitation the replacement of sacrificial anodes, use of specified lubricants, and touch-up of nicks and scratches) in order to maintain warranty coverage. Cummins MerCruiser Diesel reserves the right to make warranty coverage contingent upon proof of proper maintenance.

What Cummins MerCruiser Diesel Will Do

Cummins MerCruiser Diesel and Mercury's sole and exclusive obligation under this warranty is limited to, at our option, repairing a corroded part, replacing such part or parts with new or CMD / Mercury Marine-certified, remanufactured parts, or refunding the purchase price of the CMD / Mercury product. CMD / Mercury reserves the right to improve or modify products from time to time without assuming an obligation to modify products previously manufactured.

How to Obtain Warranty Coverage

The customer must provide Cummins MerCruiser Diesel with reasonable access to the product for warranty service and a reasonable opportunity to repair the product. Cummins MerCruiser Diesel dealer will arrange for the inspection and any covered repair. If the service provided is not covered by this warranty, purchaser shall pay for all related labor and material, and any other expenses associated with that service. Purchaser shall not, unless requested by Cummins MerCruiser Diesel, ship the product or parts of the product directly to Cummins MerCruiser Diesel. Proof of registered ownership must be presented to the dealer at the time warranty service is requested in order to obtain coverage.

What Is Not Covered

This limited warranty does not cover electrical system corrosion; corrosion resulting from damage; corrosion that causes purely cosmetic damage; abuse or improper service; corrosion to accessories, instruments, or steering systems; damage due to marine growth; replacement parts (parts purchased by the customer); products used in a commercial application. Commercial use is defined as any work-related or employment-related use of the product, or any use of the product that generates income, for any part of warranty period, even if the product is only occasionally used for such purposes.

Emission Warranty

Product Warranted	This Emission Warranty applies to new Engines certified to United States EPA 40 CFR 94 sold by CMD that are installed in vessels flagged or registered in the United States. ^{1,2.}
Coverage	CMD warrants to the first user and each subsequent purchaser that the Engine is designed, built, and equipped so as to conform at the time of sale by CMD with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within the longer of the following periods: 1. Five years or 500 hours of operation, whichever occurs first, The Emissions Warranty starts from the date of delivery of the Engine to the first user, or the date the unit is first leased, rented, or loaned, or when the Engine has been operated for 50 hours, whichever occurs first, or 2. The Base Engine Warranty.
Limitations	The owner may elect to have maintenance, replacement, or repair of the emission control parts performed by a facility other than a CMD distributor, an authorized dealer or a repair location approved by CMD, and may elect to use parts other than new genuine Cummins/Mercury Marine or Cummins / Mercury Marine-approved rebuilt parts and assemblies for such maintenance, replacement or repair; however, the cost of such service or parts and subsequent failures resulting from such service or parts will not be covered under this emission control system warranty. Failures, except those resulting from a defect in materials, or factory workmanship, are not covered by the WARRANTY. CMD IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. In the United States^{3.} and Canada, this warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Outside the United States^{4.} and Canada, in case of consumer sales, in some countries the Owner has statutory rights which cannot be affected or limited by the terms of this warranty. Nothing in this warranty excludes or restricts any contractual rights the Owner may have against third parties

Transfer Of Warranty

The limited warranty is transferable to a subsequent purchaser, but only for the remainder of the unused portion of the limited warranty. This will not apply to products used for commercial applications.

To transfer the warranty to the subsequent owner, send or fax a copy of the bill of sale or purchase agreement, new owner's name, address and engine serial number to CMD's warranty registration department.

In the United States mail to:

Cummins MerCruiser Diesel LLC, Inc.
Attn: Warranty Registration Department
4500 Leeds Avenue - Suite 301
Charleston, South Carolina 29405
1-800-668-0407
Fax 843-745-1616

Upon processing the transfer of warranty, CMD will send registration verification to the new owner of the product by mail. There is no charge for this service.

1. Locations in the United States and Canada are listed in the Cummins United States and Canada Sales and Service Directory; other locations are listed in the Cummins International Sales and Service Directory.
2. United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.
3. United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.
4. United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

For products purchased outside the United States and Canada, contact the Cummins MerCruiser Diesel Distributor or Cummins MerCruiser Diesel distributor in your country.

Notes:

Section 2 - Getting to Know Your Power Package

Table of Contents

General Information.....	12	Dual-Handle Electronic Remote Control (ERC) with DTS Trackpad Features and Operation	15
Models Covered.....	12	Operation	15
Drive Serial Number and Decal Placement	12	Basic Joystick Operation.....	17
Features and Controls.....	12	Electrical System Overload Protection.....	17
Emergency Stop (E-Stop) Switch.....	12	Vessel Interface Panel (VIP) Overload Protection	18
Instrumentation.....	13	Overload Protection for Other Circuits	18
VesselView	13	Zeus Drive Alignment.....	18
Digital Gauges (If Equipped)	13		
Analog Gauges (If Equipped)	14		
Electronic Helm Steering.....	15		

General Information

Models Covered

Models Covered	Engine Model and Rating	Serial Number Or Year
Zeus 3500	QSB5.9–330 (High Output)	Information not available at time of printing
	QSB5.9–355 Intermittent	
	QSB5.9–380 (HO)	
	QSB5.9–425 (HO)	
	QSB5.9–480 (HO)	
Zeus 3800	QSC8.3–550 (HO)	Information not available at time of printing

Drive Serial Number and Decal Placement

Serial numbers are the manufacturer's key to numerous engineering details that apply to your drive.



Drive serial number locations

- a** - Transmission serial number plate
- b** - Drive serial number decal and stamping

Refer to the engine operation and maintenance manual, available from the engine manufacturer, for the location of the engine data tag that contains the engine serial number and model number.

Features and Controls

Emergency Stop (E-Stop) Switch

The emergency stop (E-stop) switch turns off the engines in an emergency situation, such as a person overboard or tangled propeller. When activated, the E-stop switch interrupts the power supply to the main power relay, including power to the gauges, steering, and accessories.

Activation of the E-stop switch stops the engines immediately, but the boat continues to coast for some distance depending upon the velocity and degree of any turn at shutdown. However, the boat does not complete a full circle. While the boat is coasting, it can cause injury to anyone in the boat's path as seriously as the boat would when under power.

We recommend instructing other occupants on proper starting and operating procedures should they need to operate the engine in an emergency.

Accidental or unintended activation of the switch during normal operation is also possible, which can cause any or all of the following potentially hazardous situations:

- Occupants can be thrown forward due to unexpected loss of forward motion, a particular concern for passengers in the front of the boat who could be ejected over the bow and possibly struck by the propulsion or steering components.
- Operator can lose power and directional control in heavy seas, strong current, or high winds.
- Operator can lose control when docking.

Instrumentation

VESSELVIEW

VesselView is the primary information source for the Zeus drive, all engine information, fault codes, tank levels, boat direction, and calibrations. Refer to the VesselView Operators Manual for more information.



27198

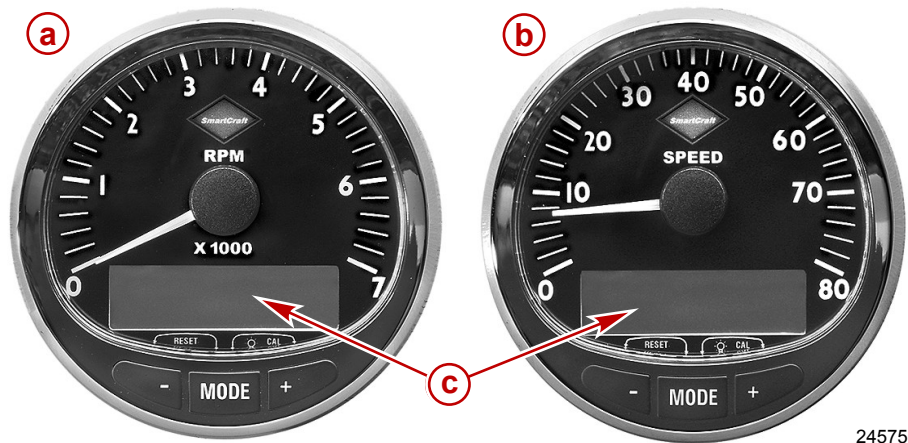
VesselView

DIGITAL GAUGES (IF EQUIPPED)

The Cummins MerCruiser Diesel SmartCraft instrument package augments the information provided by VesselView. A few of the functions the instrument package can display are:

- Engine RPM
- Boat speed
- Coolant temperature
- Oil pressure
- Battery voltage
- Fuel consumption

- Engine operating hours



Typical SmartCraft gauges

- a - Tachometer
- b - Speedometer
- c - LCD System View display

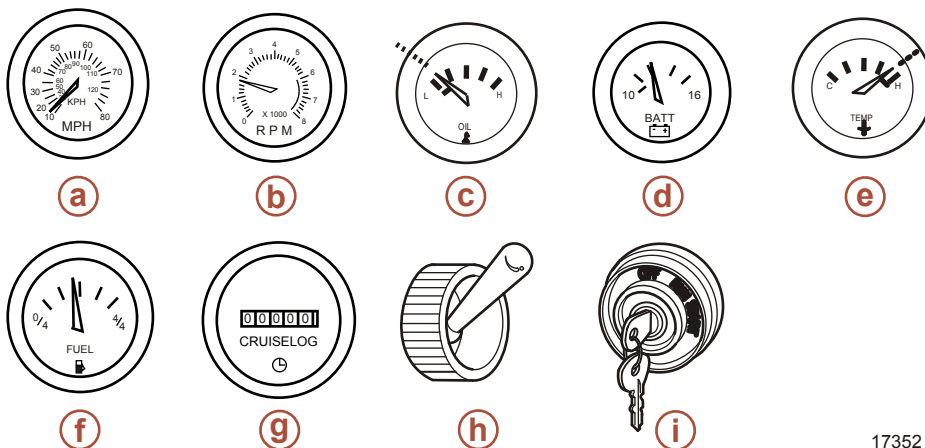
The SmartCraft instrument package also aids in identifying the fault codes associated with the sounding of the engine audio warning system. The SmartCraft instrument package displays critical engine alarm data and other potential problem areas on its LCD display.

Refer to the manual provided with your gauge package for basic operation information on the SmartCraft Instrument package and for details on the warning functions monitored by the system.

ANALOG GAUGES (IF EQUIPPED)

Other instrumentation packages have gauges that augment the information provided by VesselView. The owner and operator should be familiar with all the instruments and their functions on the boat. Because of the large variety of instrumentation and manufacturers, have your boat dealer explain the gauges and normal readings that appear on your boat.

The following types of gauges may be included with your power package.



Item	Gauge	Function
a	Speedometer	Indicates boat speed.
b	Tachometer	Indicates engine RPM.
c	Oil pressure gauge	Indicates engine oil pressure.
d	Voltmeter	Indicates battery voltage.
e	Water temperature gauge	Indicates engine operating temperature.
f	Fuel gauge	Indicates quantity of fuel in tank.
g	Hour meter	Records engine operating time.
h	Bilge blower switch	Operates bilge blower.
i	Ignition switch	Allows operator to start and stop engine.

Electronic Helm Steering

The Electronic Helm Steering is a true drive-by-wire system that controls the steering through electronic signals. The feel of the steering is created by computer-designated resistance.

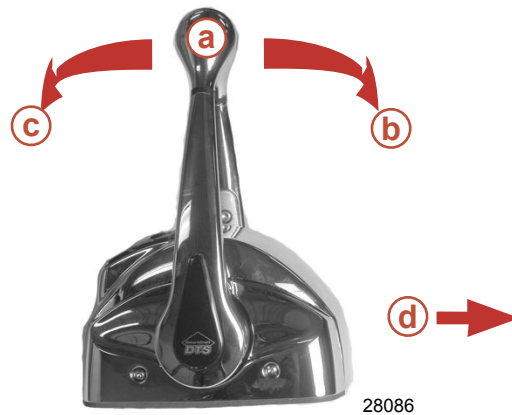
We recommend that you drive carefully until you have a chance to explore the Zeus system's handling characteristics in an open area without obstructions or other boat traffic, and you are familiar with the boat's responses. The steering is two turns lock-to-lock, providing a fast steering response. The first few maneuvers at speed can be more abrupt than expected. The number of turns lock to lock is adjustable by the distributor, if desired.

Dual-Handle Electronic Remote Control (ERC) with DTS Trackpad Features and Operation

OPERATION

The electronic remote control (ERC) handle controls the operation of shift and throttle. Push the control handle forward from neutral to the first detent for forward gear. Continue pushing the handle forward to increase speed. Pull the control handle from the forward position to the neutral position to decrease speed and eventually stop. Pull the control handle back from neutral to the first detent for reverse gear. Continue pulling the handle back to increase speed in reverse.

NOTE: In certain modes, gear position is determined by the position of the shift valves on the transmission, not the position of the ERC levers. When using the joystick or while in Skyhook, the computer moves the transmission in and out of gear even though the handles are in neutral.



- a** - Neutral
- b** - Forward
- c** - Reverse
- d** - Bow of boat

The amount of force needed to move the ERC handles and to move the ERC handles through the detents is adjustable to help prevent unwanted motion of the handle in rough water.

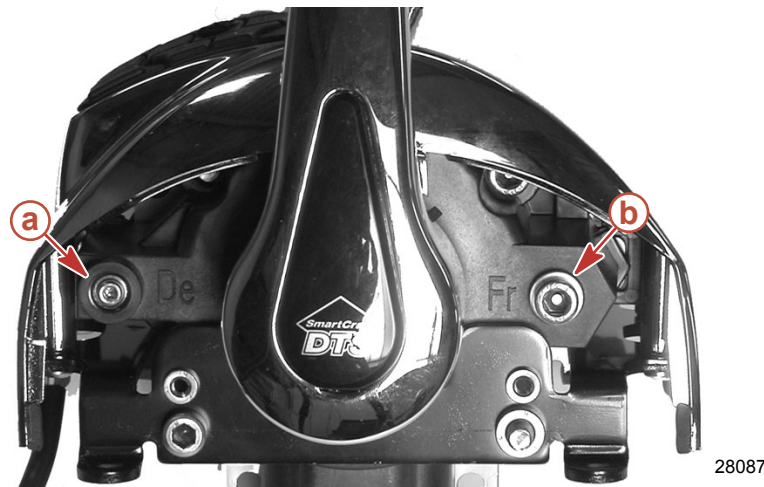
To adjust ERC handle tension:

1. Remove the side cover.
2. Turn the screw clockwise to increase tension on the control handle and counter-clockwise to decrease tension.
3. Adjust to tension desired.

To adjust ERC handle detent tension:

1. Remove the side cover.
2. Turn the screw clockwise to increase tension on the control handle and counter-clockwise to decrease tension.

3. Adjust to tension desired.



Starboard side with side cover removed.

a - ERC handle tension screw

b - ERC handle detent tension screw

Basic Joystick Operation

The joystick offers precise, intuitive control of your boat during low speed and docking maneuvers. The joystick translates the movement of the joystick into similar movement in the boat. Engine speed is limited in this mode to prevent unacceptable boat dynamics during maneuvers.

While operation with the joystick is easy to learn, we recommend that you drive the boat in the traditional way until you can spend time in an open area free of obstructions and traffic to learn how your boat responds to inputs. Further, we recommend that you occasionally practice maneuvering in the traditional way to maintain your traditional drive docking skills in case joystick control is temporarily not available.

Electrical System Overload Protection

If an electrical overload occurs, a fuse or a circuit breaker opens. Find and correct the cause for the electrical overload before replacing the fuse or resetting the circuit breaker.

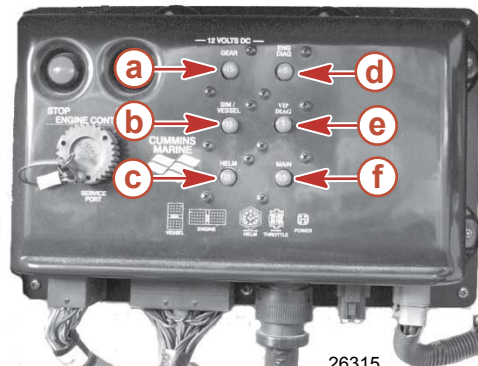
NOTE: *In an emergency, when you must operate the engine and cannot locate or correct the cause for the high current draw, turn off or disconnect all the accessories connected to the engine and instrumentation wiring. Reset the circuit breaker. If the breaker remains open, the electrical overload has not been eliminated. Contact your Cummins MerCruiser Diesel Authorized Repair Facility to check the electrical system.*

Circuit breakers and fuses provide protection for the electrical system as indicated. The circuit breakers are located in various locations throughout the boat. Have your dealer show you the location and identify the circuit that they protect.

After finding and correcting the cause of the overload, reset the circuit breaker by pressing the reset button.

VESSEL INTERFACE PANEL (VIP) OVERLOAD PROTECTION

The Vessel Interface Panel (VIP) contains six circuit breakers that help protect the transmission harness, engine harness, vessel sensor harness, and helm harness.



Port shown, starboard similar

Item	Circuit Breaker Rating	Protection	Location on VIP
a	15	Gear	Upper left
b	10	SIM/Vessel	Middle left
c	10	Helm	Lower left
d	5	Engine Diagnostics	Upper right
e	5	VIP Diagnostics	Middle right
f	25	Main	Lower right

The VIP itself is protected by a 30 amp in-line fuse between the battery bank and the VIP. The in-line fuse is often located on the fuse panel. Ask your dealer for the location.

OVERLOAD PROTECTION FOR OTHER CIRCUITS

Other circuits may be protected by circuit breakers or fuses installed by the boat manufacturer and can vary in appearance and location. Ask your dealer for the location and operation instructions of all overload protection devices.

- Circuit breakers are used to protect the backup hydraulic system. The 30 amp breakers, one for each drive, are installed by the boat manufacturer and may vary in appearance and location. Ask your dealer for the location and operating instructions.
- The MerCathode system has a 20 amp in-line fuse in the wire that connects from the positive (+) battery terminal to the positive (+) terminal on the controller. If the fuse is defective (open), the system will not operate, resulting in a loss of corrosion protection. Have your dealer show you the location of and service procedures for the fuse.

Zeus Drive Alignment

The Zeus Drives are aligned by the boat manufacturer, and must not be adjusted by anyone other than your Cummins MerCruiser Diesel Authorized Service and Repair Facility. The Zeus drives automatically recalibrate to this setting at each startup. The drives do not need to be re-aligned under normal use.

Section 3 - On The Water

Table of Contents

Safe Boating Suggestions.....	20	Smoothing the Ride	36
Be Alert To Carbon Monoxide Poisoning.....	21	Correcting a List	36
Good Ventilation	21	Low Speed Trim	36
Poor Ventilation	22	Special Digital Throttle and Shift (DTS) Features	37
Basic Boat Operation.....	22	Troll and Throttle Response	38
Freezing Temperature and Cold Weather		Dock	39
Operation.....	22	Throttle Only	39
Drain Plug and Bilge Pump.....	23	1 (One) Lever	40
Protecting People in the Water.....	23	Sync	40
While the Boat is Moving	23	Cruise Control.....	41
While the Boat is Stationary	23	Precision Pilot Track Pad Features.....	41
Wave and Wake Jumping.....	24	General Information	41
Impact with Underwater Hazards.....	24	Standby	42
Zeus Drive Impact Protection.....	25	Standby and Active Lights	43
Conditions Affecting Boat Operation.....	25	Power Icon	43
Weight Distribution (Passengers and Gear)		Skyhook	44
Inside the Boat.....	25	Skyhook Screen Notes	45
Bottom Of Boat.....	26	Engaging Skyhook	46
Cavitation.....	26	Disengaging Skyhook	46
Ventilation.....	26	Turn Buttons	47
Propeller Selection.....	26	Auto Heading	48
Getting Started.....	27	Disengage Auto Heading	49
Break-In Period (New or With Replacement		To Resume to a Heading	50
Gears).....	27	Track Waypoint	51
Starting and Stopping the Engines.....	27	Engaging Track Waypoint Mode	52
Normal Starting	27	Disengaging Track Waypoint Mode	53
Normal Stopping	28	Turn Button or Joystick in Track Mode	53
Starting the Engines—Manual Override	28	Auto Heading Button in Track Mode	53
Stopping the Engines—Manual Override	30	Acknowledging a Turn During a Waypoint	
Traditional Maneuvering with Steering and		Arrival	54
Thrust.....	30	Waypoint Sequence	55
To Maneuver the Boat in Forward	31	Waypoint Acknowledge	56
To Steer the Boat in Tight Turns at Low		Response Button	58
Speeds	31	Changing VesselView Mode Display Times	58
To Spin the Boat on its Axis at Low Speeds	31	End of First Season Checkup.....	58
Maneuvering with the Joystick.....	31	Contingent Operations.....	59
Trim Tab Override.....	35	Backup Steering System.....	59
Manual Adjustment	35	Port Engine Only Operation.....	59
Trim Tab Override Use	36	Gear Engagement—Emergency Procedure	59
Getting on Plane	36		

Safe Boating Suggestions

In order to safely enjoy the waterways, familiarize yourself with local and all other governmental boating regulations and restrictions, and also consider the following suggestions.

- Know and obey all nautical rules and laws of the waterways.

Cummins MerCruiser Diesel strongly recommends that all powerboat operators complete a boating safety course. Courses are offered in the U.S.A. by the U.S. Coast Guard Auxiliary, the Power Squadron, the Red Cross, and your state or provincial boating law enforcement agency. Inquiries may be made to the Boating Hotline at 1-800-368-5647 or the Boat U.S. Foundation at 1-800-336-BOAT.

- **Perform safety checks and required maintenance.** Follow a regular schedule and ensure that all repairs are properly made.
- **Check safety equipment on board.** Here are some suggestions of the types of safety equipment to carry when boating:
 - ☐ Approved fire extinguishers
 - ☐ Paddle or oar
 - ☐ Signal devices: flashlight, rockets or flares, flag, and whistle or horn
 - ☐ Transistor radio
 - ☐ Tools necessary for minor repairs
 - ☐ First aid kit and instructions
 - ☐ Anchor and extra anchor line
 - ☐ Waterproof storage containers
 - ☐ Manual bilge pump and extra drain plugs
 - ☐ Spare operating equipment, batteries, bulbs, and fuses
 - ☐ Drinking water
 - ☐ Compass and map or chart of the area
- **Watch for signs of weather change and avoid foul weather and rough-sea boating.**
- **Tell someone where you are going and when you expect to return.**
- **Passenger boarding.** Stop the engine whenever passengers are boarding, unloading, or are near the back (stern) of the boat. Shifting the drive unit into neutral is not sufficient.
- **Use personal flotation devices.** Federal law requires that there be a U. S. Coast Guard–approved, wearable-type life jacket (personal flotation device), correctly sized and readily accessible for every person aboard, plus a throwable cushion or ring. We strongly advise that everyone wear a life jacket at all times while in the boat.
- **Prepare other boat operators.** Instruct at least one person aboard in the basics of starting and operating the engine and handling the boat in case the driver becomes disabled or falls overboard.
- **Do not overload your boat.** Most boats are rated and certified for maximum load (weight) capacities (refer to your boat capacity plate). Know your boat's operating and loading limitations. Know if your boat will float if full of water. When in doubt, contact your authorized Cummins MerCruiser Diesel dealer/distributor or the boat manufacturer.

- **Ensure that everyone in the boat is properly seated.** Do not allow anyone to sit or ride on any part of the boat that was not intended for such use. This includes the backs of seats, gunwales, transom, bow, decks, raised fishing seats, and any rotating fishing seat; anywhere that sudden unexpected acceleration, sudden stopping, unexpected loss of boat control or sudden boat movement could cause a person to be thrown overboard or into the boat. Ensure that all passengers have a proper seat and are in it before any boat movement.
- **Never be under the influence of alcohol or drugs while boating (it is the law).** Alcohol or drugs impairs your judgment and greatly reduce your ability to react quickly.
- **Know your boating area and avoid hazardous locations.**
- **Be alert.** The operator of the boat is responsible by law to maintain a proper lookout by sight and hearing. The operator must have an unobstructed view particularly to the front. No passengers, load, or fishing seats should block the operator's view when operating the boat above idle or planing transition speed. Watch out for others, keep your eyes on the the water, and be aware of your wake.
- **Never drive your boat directly behind a water skier in case the skier falls.** As an example, your boat traveling at 40 km/h (25 MPH) will overtake a fallen skier who was 61 m (200 ft.) in front of you in five seconds.
- **Watch fallen skiers.** When using your boat for water skiing or similar activities, always keep a fallen or down skier on the operator's side of the boat while returning to attend to the skier. The operator should always have the down skier in sight and never back up to the skier or anyone in the water.
- **Report accidents.** Boat operators are required by law to file a Boating Accident Report with their state boating law enforcement agency when their boat is involved in certain boating accidents. A boating accident must be reported if 1) there is loss of life or probable loss of life, 2) there is personal injury requiring medical treatment beyond first aid, 3) there is damage to boats or other property where the damage value exceeds US \$500.00 or 4) there is complete loss of the boat. Seek further assistance from local law enforcement.

Be Alert To Carbon Monoxide Poisoning

Carbon monoxide is present in the exhaust fumes of all internal combustion engines including the outboards, sterndrives and inboard engines that propel boats, as well as the generators that power various boat accessories. Carbon monoxide is a deadly gas that is odorless, colorless and tasteless.

Early symptoms of carbon monoxide poisoning, which should not be confused with seasickness or intoxication, include headache, dizziness, drowsiness and nausea.

WARNING

Carbon monoxide poisoning can lead to unconsciousness, brain damage, or death. Keep the boat well ventilated while at rest or underway and avoid prolonged exposure to carbon monoxide.

GOOD VENTILATION

Ventilate the passenger area, open the side curtains or forward hatches to remove fumes.

1. Example of desired air flow through the boat.



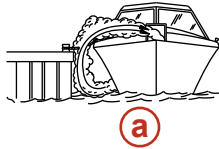
mc79553-1

POOR VENTILATION

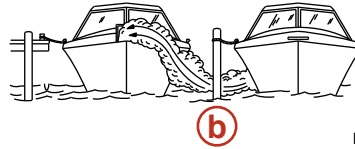
Under certain conditions, permanently enclosed or canvas enclosed cabins or cockpits with insufficient ventilation may draw in carbon monoxide. Install one or more carbon monoxide detectors in your boat.

Although the occurrence is rare, on a very calm day, swimmers and passengers in an open area of a stationary boat that contains or is near an operating engine may be exposed to a hazardous level of carbon monoxide.

1. Examples of poor ventilation while a boat is stationary:



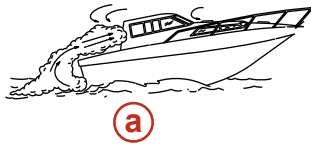
a - Operating the engine when the boat is moored in a confined space



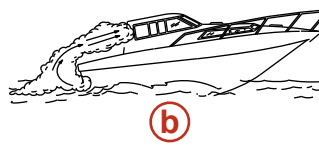
b - Mooring close to another boat with its engine operating

mc79554-1

2. Examples of poor ventilation while a boat is moving:



a - Operating the boat with the trim angle of the bow too high



b - Operating the boat with no forward hatches open (station wagon effect)

mc79556-1

Basic Boat Operation

Freezing Temperature and Cold Weather Operation

IMPORTANT: If the boat is operated during periods of freezing temperature, take precautions to prevent freezing damage to the power package. Damage caused by freezing is not covered by Cummins MerCruiser Diesel Limited Warranty.

NOTICE

Water trapped in the seawater section of the cooling system can cause corrosion or freeze damage. Drain the seawater section of the cooling system immediately after operation or before any length of storage in cold weather. If the boat is in the water, keep the seacock closed until restarting the engine to prevent water from flowing back into the cooling system. If the boat is not fitted with a seacock, leave the water inlet hose disconnected and plugged.

NOTE: As a precautionary measure, attach a tag to the key switch or steering wheel of the boat reminding the operator to open the seacock or unplug and reconnect the water inlet hose before starting the engine.

In order to operate the engine in temperatures of 0° C (32° F) or lower, observe the following instructions:

- At the end of each daily operation, completely drain the seawater section of the cooling system to protect against damage by freezing.
- At the end of each daily operation, drain the water from the water separator, if equipped. Fill the fuel tank at end of daily operation to prevent condensation.

- Use the required permanent-type antifreeze solution to protect components against damage by freezing.
- Use proper cold weather lubrication oil; ensure that the crankcase contains a sufficient amount.
- Make certain that the battery is of sufficient size and is fully charged. Check that all other electrical equipment is in optimum condition.
- At temperatures of -20°C (-4°F) and below, use a coolant heater to improve cold starting.
- If operating in arctic temperatures of -29°C (-20°F) or lower, consult your Cummins MerCruiser Diesel Authorized Repair Facility for information about special cold weather equipment and precautions.

See **Section 6** for cold weather or extended storage related information.

Drain Plug and Bilge Pump

The engine compartment in your boat is a natural place for water to collect. For this reason, boats are normally equipped with a drain plug, a bilge pump, or both a drain plug and a bilge pump. Install the drain plug and check the operation of the bilge pump, if equipped, before putting the boat in the water.

Check these items on a regular basis to ensure that the level of water does not come into contact with your power package. Components on your engine will be damaged if submerged.

Damage caused by submersion is not covered by the Cummins MerCruiser Diesel Limited Warranty.

Protecting People in the Water

WHILE THE BOAT IS MOVING

A person in the water may find it very difficult to take quick action to avoid a boat heading in their direction, even at slow speeds.



21604

Always slow down and exercise extreme caution any time you are boating in an area where there might be people in the water.

Whenever a boat is moving (even coasting) and the gear shift is in neutral, there is sufficient force by the water on the propeller to cause the propeller to rotate. This neutral propeller rotation can cause serious injury.

WHILE THE BOAT IS STATIONARY

WARNING

A spinning propeller, a moving boat, or any solid device attached to the boat can cause serious injury or death to swimmers. Stop the engine immediately whenever anyone in the water is near your boat.

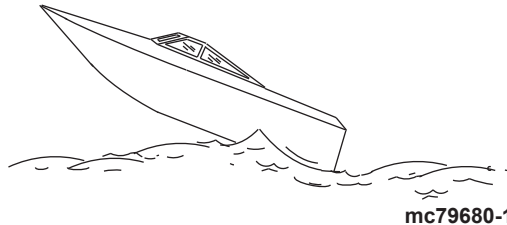
Shift into neutral and shut off the engines before allowing people to swim or be in the water near your boat.

Do not allow people to swim around the boat with the Skyhook Electronic Anchor engaged. The Skyhook Electronic Anchor causes the drives to move and the propellers to turn without notice. Having the engines in neutral does not protect the swimmers. Swimmers in the area of the propellers are at risk of getting injured.

Wave and Wake Jumping

⚠ WARNING

Wave or wake jumping can cause serious injury or death from occupants being thrown within or out of the boat. Avoid wave or wake jumping whenever possible.

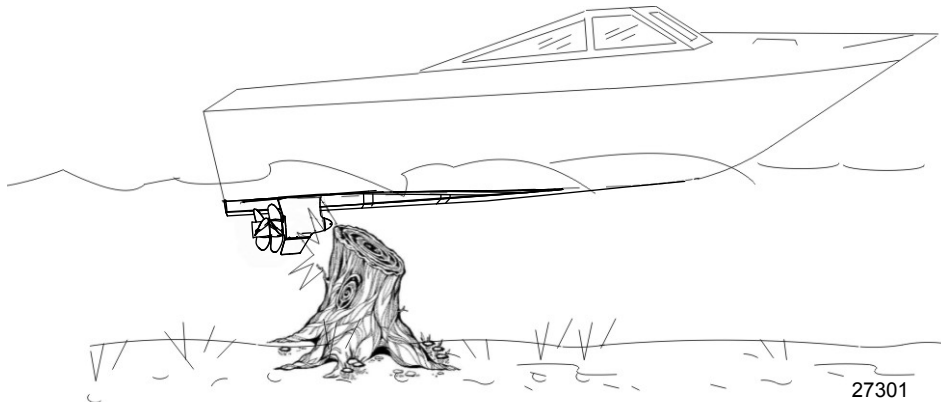


Operating recreational boats over waves and wakes is a natural part of boating. However, when this activity is done with enough speed to force the boat hull partially or completely out of the water, certain hazards arise, particularly when the boat re-enters the water.

The primary concern is the boat changing direction while in the midst of the jump. In such cases the landing may cause the boat to violently veer in a new direction. Such a sharp change in direction or turn can cause occupants to be thrown out of their seats or out of the boat.

Impact with Underwater Hazards

Reduce speed and proceed with caution whenever you are driving a boat in shallow water or in areas where the waters are suspected of having floating or underwater obstacles that could be struck by the underwater drive components, skegs, or the boat bottom.



IMPORTANT: The most important thing you can do to help reduce injury or impact damage from striking a floating or underwater object is control the boat speed. Under these conditions, reduce boat speed to a minimum.

The following demonstrate some, but not all, examples of what can happen if the boat strikes a floating or underwater object:

- The boat could move in a new direction. Such an unexpected change in direction or turn can throw occupants out of their seats or out of the boat.
- A rapid reduction in speed. This can cause occupants to be thrown forward, even out of the boat.

- Impact damage to the underwater drive components, skeg, or boat.

Keep in mind that one of the most important things you can do to help reduce injury or impact damage in these situations is control the boat speed when driving in waters known to have underwater obstacles.

After striking a submerged object, stop the engine as soon as possible and inspect the drive systems for any broken or loose parts, and the hull for any damage. If damage is present or suspected, the power package should be taken to an Authorized Cummins MerCruiser Diesel Repair Facility for a thorough inspection and any necessary repair.

The boat should be checked for hull fractures, transom fractures, and water leaks.

WARNING

Operating a boat with impact damage can result in product damage, serious injury, or death. If the boat experiences an impact, have an Authorized Cummins MerCruiser Diesel Repair Facility inspect the vessel and power package and perform repairs as necessary.

Operating with damaged underwater drive components or boat bottom could cause additional damage to other parts of the power package, or could affect control of the boat. If continued operation is necessary, do so at greatly reduced speeds.

Zeus Drive Impact Protection

IMPORTANT: Although the design of the Zeus drive provides some impact protection, no design can ensure total protection from impact damage under all conditions.

The Zeus drive has some impact protection by design, since the drive is mounted in a tunnel above the bottom of the hull. If the drive strikes a floating or submerged object while the boat is moving, the skeg is designed to break away, absorbing some of the impact and possibly reducing damage to the propellers and the exposed lower part of the drive. In extreme cases, large fixed or floating objects struck by the skeg and the exposed lower part of the drive may cause the lower part of the drive to shear off. This shearing off of the lower part of the drive is a design feature to protect the hull and drive system.

NOTE: *If the lower part of the drive shears off due to a severe impact, make immediate note of the GPS location to assist in recovery efforts. If recovery of the damaged parts of the drive is possible, return the damaged parts to your Authorized Cummins MerCruiser Diesel Repair Facility for possible repair and reuse.*

If an impact occurs and damage is present or suspected, if the boat does not respond as it should, or if water is present in the gear lube monitor bottle, have your boat inspected at the nearest Authorized Cummins MerCruiser Diesel Repair Facility.

Operating in reverse gear offers less impact protection. Use extreme caution when operating in shallow water or where underwater objects are known to be present. Use extreme care to prevent striking submerged objects while operating in reverse.

Conditions Affecting Boat Operation

Weight Distribution (Passengers and Gear) Inside the Boat

Shifting weight to the rear (stern):

- Causes the bow to bounce in choppy water.
- Increases the danger of a following wave splashing into the boat when coming off plane.
- Can cause the boat to porpoise at extremes.

Shifting weight to the front (bow):

- Improves ease of planing.

- Improves rough water ride.
- Can cause the boat to veer back and forth (bow steer) at extremes.

Bottom Of Boat

To maintain maximum speed, the boat bottom should be:

- Clean and free of barnacles and marine growth.
- Straight and smooth (fore and aft).

Marine vegetation can accumulate when the boat is docked. Remove this growth before operation; it can clog the water inlets and outlets, causing the engine to overheat.

Cavitation

Cavitation occurs when water flow cannot follow the contour of a fast-moving underwater object, such as a gear housing or a propeller. Cavitation permits the propeller to speed up, but the boat speed to reduce. Cavitation can seriously erode the surface of the gear housing or the propeller. Common causes of cavitation are:

- Weeds or other debris snagged on the propeller
- Bent propeller blade
- Raised burrs or sharp edges on the propeller

Ventilation

Ventilation is caused by surface air or exhaust gases that are introduced around the propeller resulting in propeller speed-up and a reduction in boat speed. Air bubbles strike the propeller blade and cause erosion of the blade surface. If allowed to continue, eventual blade failure (breakage) will occur. Excessive ventilation is usually caused by:

- A missing propeller diffuser ring.
- A damaged propeller or gear housing, which allows exhaust gases to escape between propeller and gear housing.

Propeller Selection

IMPORTANT: The installed propeller must allow the engine to operate at the Engine Rated RPM (revolutions per minute). Use an accurate service tachometer to verify engine operating RPM.

It is the responsibility of the boat manufacturer or the selling dealer to equip the power package with the correct propeller. Refer to the **Diesel Parts And Accessories Guide** and read **Everything You Need To Know About Propellers**. Refer to the **Marine Recreational High Output Propulsion Units QSB and QSC Operation and Maintenance Manual** for the specified Engine Rated RPM.

Select a propeller that will allow the engine power package to operate at the Engine Rated RPM with a full load on board.

If full throttle operation is below the recommended range, change the propellers to prevent loss of performance and possible engine damage. On the other hand, operating an engine above the recommended Engine Rated RPM causes higher-than-normal wear or damage.

After initial propeller selection, the following common problems may require a lower pitch propeller:

- Warmer weather and greater humidity can cause a loss of RPM (not as significant on these models).
- Operating in a higher elevation causes a loss of RPM (not as significant on these models).
- Operating with a dirty boat bottom causes a loss of RPM.

- Operating with increased load (additional passengers or gear) causes a loss of RPM. Because of the many variables of boat design, only testing will determine the best propeller for a particular application. Available propellers are listed in the **Diesel Parts And Accessories Guide**.

Contact your Authorized Cummins MerCruiser Diesel Repair Facility for assistance on propeller selection.

Getting Started

Break-In Period (New or With Replacement Gears)

Always perform these procedures on new drive units. This break-in procedure allows the proper seating of drive unit gears and related components, which greatly reduces the likelihood of problems.

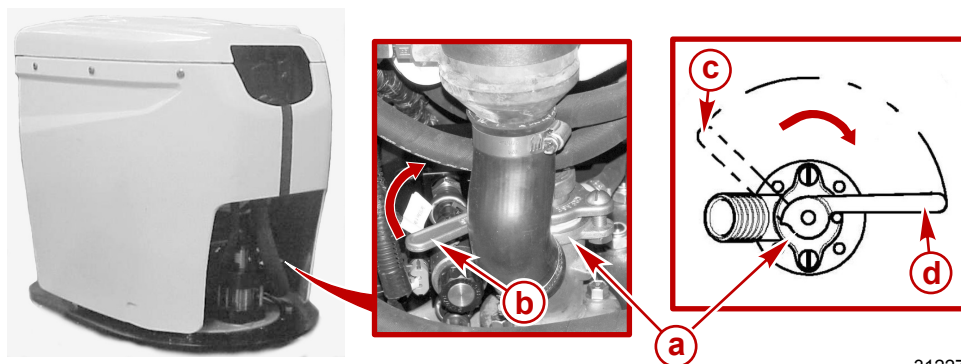
- Avoid full throttle starts.
- Do not operate at any one constant speed for extended periods of time.
- Do not exceed 75% of full throttle during the first 5 hours. During the next 5 hours, operate at intermittent full throttle.
- Shift the drive into forward gear a minimum of 10 times during break-in, with run-in time at moderate RPM after each shift.
- After the first 25 hours and not to exceed 30 hours, change the transmission fluid and filter including the transmission fluid in the drop box, if equipped.

Starting and Stopping the Engines

Your Zeus power package is equipped with a "SmartStart" system, as well as a backup, manual override engine start and stop system. Start and stop the engine from the helm using the "SmartStart" system, in normal circumstances.

NORMAL STARTING

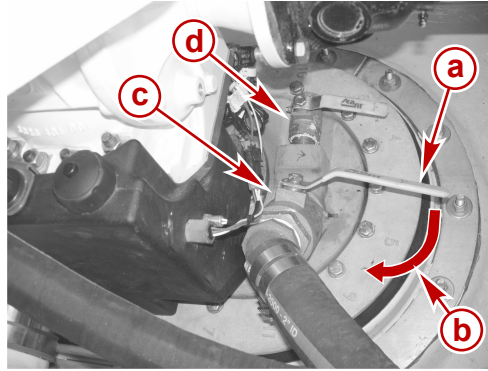
1. Perform the drive checks listed in **Section 5-Routine Maintenance, Each Day Start and When Refueling**.
2. Perform the checks and steps listed in the engine's operation and maintenance manual available for this package.
3. Open the seawater return seacock, if not already in the open position.



31227

- a** - Seawater return (overboard) seacock
- b** - Seacock handle
- c** - Handle in closed position
- d** - Handle in open position

4. Open the seacock for the engine seawater inlet and the seacock (if equipped) for any accessory equipment.



Typical

- a - Seacock handle (in closed position)
- b - Direction to move handle to open
- c - Seacock for engine seawater inlet
- d - Seacock (if equipped) for accessory seawater inlet

5. Move the ERC handles to the neutral position.
6. Turn the key switch to the on position for each engine being started.
7. Verify that the engines are safe to start.
8. Press and release the "START/STOP" button corresponding to the engine being started. The onboard computers automatically control the starter to achieve a successful start.



Typical SmartStart switch

NORMAL STOPPING

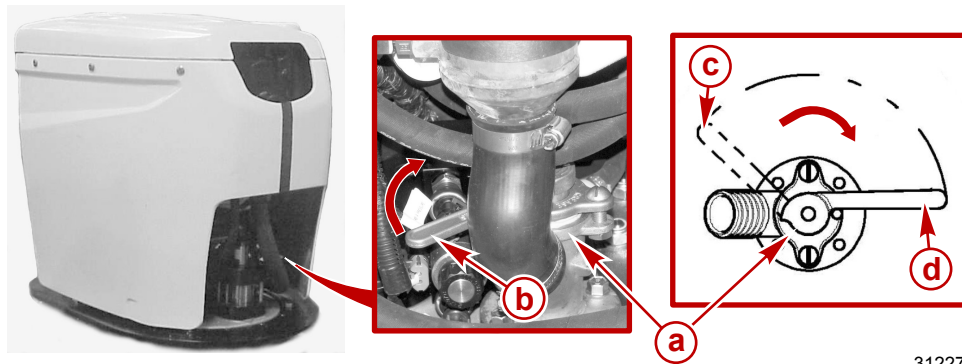
1. Move the ERC handles to the neutral position.
2. When the engines are running, press and release the "START/STOP" button corresponding to the engine to be stopped.
3. Turn the key switch to the off position.

STARTING THE ENGINES—MANUAL OVERRIDE

Under certain circumstances, the engine control systems may not be able to automatically start an engine. If this is the case, start the engine with a manual override switch in the engine room.

1. Perform the drive checks listed in **Section 5-Routine Maintenance, Each Day Start and When Refueling.**

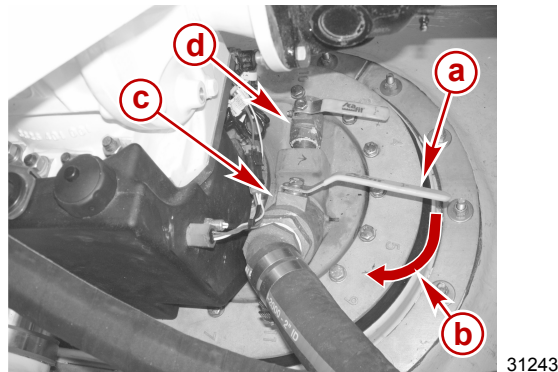
2. Perform the checks and steps listed in the engine's operation and maintenance manual available for this package.
3. Open the seawater return seacock, if not already in the open position.



31227

- a** - Seawater return (overboard) seacock
- b** - Seacock handle
- c** - Handle in closed position
- d** - Handle in open position

4. Open the seacock for the engine seawater inlet and the seacock (if equipped) for any accessory equipment.



31243

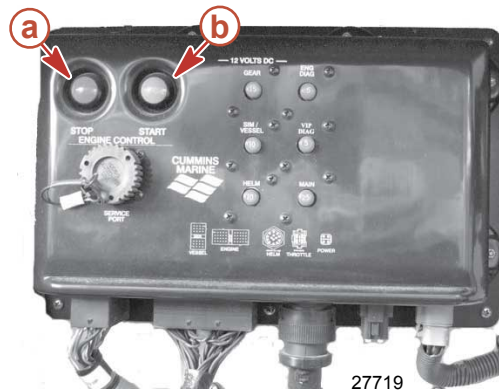
Typical

- a** - Seacock handle (in closed position)
- b** - Direction to move handle to open
- c** - Seacock for engine seawater inlet
- d** - Seacock (if equipped) for accessory seawater inlet

NOTE: The neutral LED lamps flash on and off if the ERC handles are not in the neutral position when the key switch is turned to the on position. Also, the propellers do not spin and the throttles are not active until the ERC handles are first returned to the neutral position if the engines are started with the ERC handles in a gear position. Returning the ERC handles to neutral stops the neutral LED lamps from flashing, restoring propeller and throttle control.

5. Move the ERC handles to the neutral position.
6. Turn the key switch to the on position for each engine to be started.
7. Verify that the engines are safe to start.
8. Locate the Vessel Interface Panel (VIP) in the engine room for each engine.

9. Press and hold the green "START" button on the respective VIP until the engine starts. Do not hold the button for more than 30 seconds if the engine fails to start. Allow the starter to cool before attempting to start again.



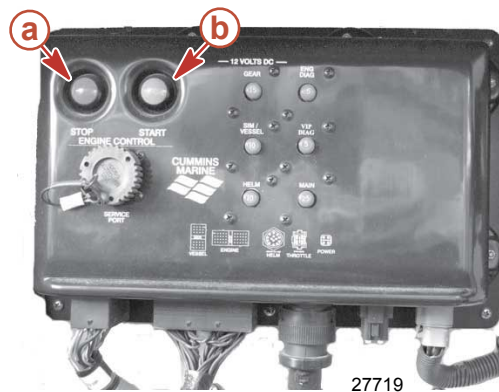
Starboard VIP shown

- a** - Red manual "STOP" switch
b - Green manual "START" switch

STOPPING THE ENGINES—MANUAL OVERRIDE

Under certain circumstances, the engine control systems may not be able to automatically stop an engine. If this is the case, stop the engines with the manual override switch in the engine room.

1. Move the ERC handles to the neutral position.
2. Locate the Vessel Interface Panel (VIP) for each engine in the engine room.
3. When the engines are running, press and hold the respective red "STOP" button until the desired engine comes to a complete stop.



Starboard VIP shown, port similar

- a** - Red manual "STOP" switch
b - Green manual "START" switch

4. Turn the key switch to the "OFF" position for each engine stopped.

Traditional Maneuvering with Steering and Thrust

You can maneuver your Zeus-equipped vessel much like a traditional inboard boat. However, the Zeus drive system expands the maneuvering capability of your vessel at both slow and planing speeds. At slow speeds, the drive system is capable of directing the thrust to produce more responsive turning of the vessel. The Zeus drive system features counter-rotating propellers that do not produce any sideways motion when accelerating or slowing down.

NOTE: During slow-speed turning with the wheel, the drive on the inside turns as much as 42° to create very tight turns. Different from traditional boats, to tighten the turn, you can increase power to the inside drive.

TO MANEUVER THE BOAT IN FORWARD

Place one or both engines in forward gear and steer with the steering wheel as you would any comparable boat.

TO STEER THE BOAT IN TIGHT TURNS AT LOW SPEEDS

- To turn the boat in tight turns at low speeds, turn the wheel in the direction of the turn.
- To increase the turn rate of the boat after the wheel is completely turned, you may increase the power to the inside drive.

TO SPIN THE BOAT ON ITS AXIS AT LOW SPEEDS

- To spin to the right, place the starboard engine in reverse and the port engine in forward.
- To spin to the left, place the port engine in reverse and the starboard engine in forward.
- To increase the rate of turn, simultaneously adjust each ERC lever for more throttle.

Maneuvering with the Joystick

The joystick provides an intuitive driver interface to maneuver the vessel. Operating the vessel with the joystick is well suited for close quarter operations and when docking. The joystick causes the computer control system to automatically calculate the steering angle of each drive, the throttle level, and the proper shift and clutch slip percentage to push or rotate the boat in a direction corresponding to the joystick movement or twist. For example, if you move the joystick sideways, the computer control system applies a thrust to the boat in the sideways direction.

You can move the joystick in any direction, and the boat moves in that direction without turning. For example, moving the joystick to port causes the boat to move sideways to port. Rotating the joystick creates forces that cause the boat to rotate around its center. You can move and rotate the joystick at the same time, allowing for very intricate movements for maneuvering in tight quarters.

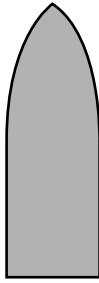
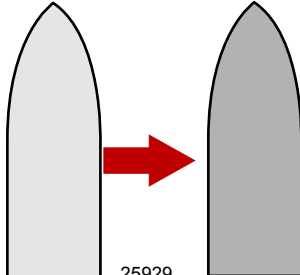
The computer control system automatically attempts to dampen bow swinging during joystick operation. If the joystick is not twisted, the computer measures the yaw rate of the boat and actively counteracts the yaw motion of the boat.

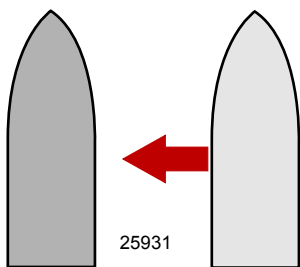
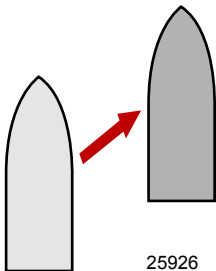
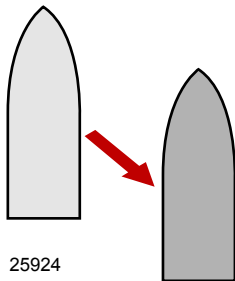
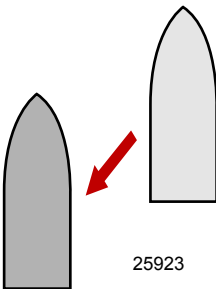
The following table gives some limited examples of the basic responses to inputs from the joystick. The joystick is proportional, which means that the farther from the center the joystick is moved, the more thrust is applied to the boat in that direction.

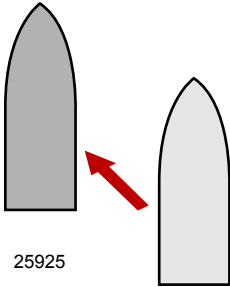
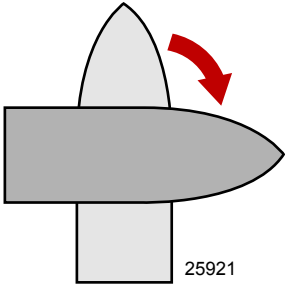
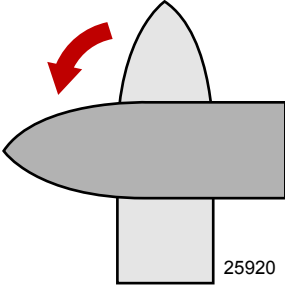
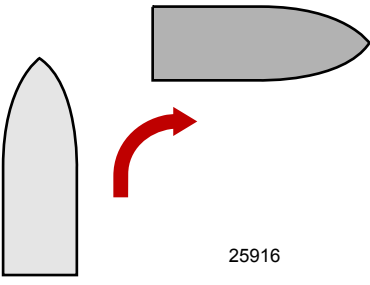
To maneuver the boat with the joystick:

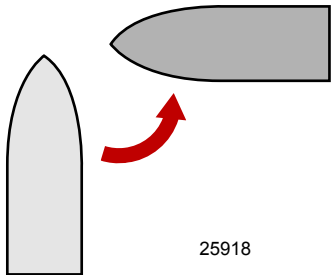
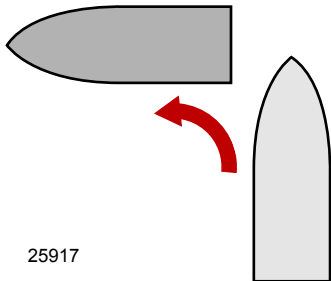
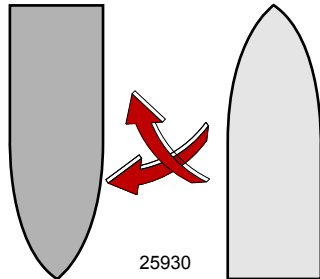
1. Move both electronic remote control (ERC) levers to the neutral position.
2. Move the joystick in the direction that you want the boat to move, or twist the joystick in the direction that you want the boat to rotate. The joystick can be moved and rotated at the same time.

Maneuvering with the Joystick

Joystick Input	Boat Response	Movement (shown from light gray to dark gray)
 24704	Boat at rest	 25911
 24705	Boat moves forward	 25928
 24706	Boat moves aft	 25927
 24707	Boat moves to starboard without rotating	 25929

Joystick Input	Boat Response	Movement (shown from light gray to dark gray)
 24708	Boat moves to port without rotating	 25931
 24709	Boat moves diagonally forward and to the starboard without rotating	 25926
 24710	Boat moves diagonally aft and to the starboard without rotating	 25924
 24711	Boat moves diagonally aft and to the port without rotating	 25923

Joystick Input	Boat Response	Movement (shown from light gray to dark gray)
 24712	Boat moves diagonally forward and to the port without rotating	 25925
 24713	Boat rotates clockwise	 25921
 24714	Boat rotates counter clockwise	 25920
 24715	Boat moves diagonally forward and to the starboard while rotating clockwise	 25916

Joystick Input	Boat Response	Movement (shown from light gray to dark gray)
 24718	Boat moves diagonally forward and to the starboard while rotating counterclockwise	 25918
 24719	Boat moves diagonally forward and to the port while rotating counterclockwise	 25917
 24720	Boat moves to the port while rotating clockwise	 25930

Trim Tab Override

The Zeus drive comes equipped with automatic trim tabs that operate via computer control to provide basic performance control and efficiency improvements. However, a trim override allows manual adjustments for natural conditions that affect the attitude of the boat.

MANUAL ADJUSTMENT

You can manually adjust the automatic tabs for conditions by using the individual tab switches as needed. The trim tabs continue to operate normally with the additional adjustments until cleared or adjusted again, or until a change in the speed of the boat causes the tabs to automatically readjust.

Activating the override switch turns off the automatic tabs. With the automatic tabs turned off, the port ("PORT") and starboard ("STBD") switches provide total control of the tabs. While this is possible, we do not recommend overriding the automatic tabs, as it is difficult for the operator to adjust the tabs as efficiently as the automatic control.



Typical trim tab switches with auto override

TRIM TAB OVERRIDE USE

The automatic trim tab system provided with your Zeus drive does a good job of trimming the vessel under normal conditions. However, conditions are not always normal, and additional minor adjustments are often desired to fine-tune the boat's attitude for the most comfortable and efficient operation. Achieving trim is obtaining the desired operating attitude when operating in less than ideal conditions. The following are conditions where additional minor adjustments to the trim tabs might be beneficial.

GETTING ON PLANE

During initial acceleration, the tabs automatically drop (bow down) to bring the boat on plane faster, to improve forward visibility, and use less power. As the boat comes on plane, the tabs are brought up so the bow not plow. The tabs can be manually adjusted for the best performance when the boat conditions are temporarily outside the normal operating conditions, as when the boat is fully loaded.

SMOOTHING THE RIDE

A head sea can create an uncomfortable, jarring ride. Put the tabs to a mid-position. As the wave throws the bow up, tabs dampen the boat's reaction, leveling and smoothing the ride. In a following sea, put the tabs up. This allows the bow to lift, offsetting the waves, which lift the stern. In milder water, some boats gently porpoise. Drop the tabs, a little at a time, until the lope disappears.

CORRECTING A LIST

Listing may be caused by an unbalanced load. A little down tab on the side of the heavy load levels the ride. List may also occur in a quarter following sea. Waves lift the stern unevenly, causing the boat to pitch forward and roll opposite the lift. If the starboard transom is lifting, drop the port tab a little. This removes the listing and produce a dryer, more level ride.

LOW SPEED TRIM

In controlled speed zones, many boats start to fall off plane as the speed decreases, thereby reducing visibility. Lowering both trim tabs keeps a boat on plane longer at legal, lower speeds, while maintaining a level boat attitude.

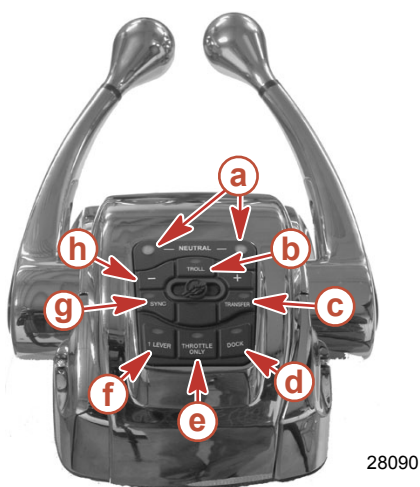
At idle speed, bow steering (wandering side to side) requires constant correction to maintain a heading. Dropping both tabs creates stern drag, which improves tracking.

Tabs can also help reduce roll. When a boat is at rest, a wave which normally causes rolling must first move water out of the way, from above one tab and below the other. This dampens rolling.

Special Digital Throttle and Shift (DTS) Features

The DTS system features several alternate operational modes for the Electronic Remote Control (ERC) levers. Any of the listed features can be operated simultaneously and can help you with:

- Warming the engines.
- Synchronizing the engines.
- Trolling the vessel for docking operations.
- Allowing access to the slow speed trolling features of the integrated transmission system.



28090

ERC Levers with DTS Trackpad

Item	Control	Function
a	"NEUTRAL" lights	Illuminate when the transmission is in the neutral gear position. The lights flash when the engine is in throttle only mode.
b	"TROLL"	"TROLL" sets the boat speed for slow speed cruising or maneuvering.
c	"TRANSFER"	Allows boat control to be transferred to a different helm. Refer to Helm Transfer
d	"DOCK"	Reduces throttle capacity to approximately 50% of normal throttle.
e	"THROTTLE ONLY"	Allows the boat operator to increase engine RPM for warm-up, without shifting the transmission into gear.
f	"1 LEVER"	Enables the throttle and shift functions of both engines to be controlled by the port lever.
g	"SYNC"	Turns off or on the auto-synchronization feature. Refer to Synchronizing Engines
h	"+" (increase) and "-" (decrease)	Increases and decreases settings for various functions, like speed of cruise control.

NOTE: Not all functions may be active.

TROLL AND THROTTLE RESPONSE

Troll mode allows the vessel to operate at very low speeds by controlling the transmission. The transmission is capable of reducing the propeller speed lower than the engine speed. Lever control is adjusted so that trolling occurs within the first 25% of lever travel. From 26% to 100% lever travel the engine is commanded between idle speed and maximum rated engine speed.



"TROLL" button

To engage Troll mode:

1. Place both ERC levers in neutral.
2. Press the "TROLL" button, located on the DTS Trackpad attached to the ERC levers.
3. Place either ERC lever into gear.
4. The "TROLL" button lights when the lever or levers are moved out of neutral.
5. The RPM of the engines do not change for the first 25% of ERC lever travel while the transmissions allow some slippage at lower speeds. Engine RPM rises through the remaining 75% of lever travel.

To disengage Troll mode:

1. Bring both ERC levers to neutral.
2. Press the "TROLL" button. The "TROLL" button light turns off.

DOCK

The Dock mode reduces the RPM throughout the range by 50%. This allows better control of engine power in close quarter situations.



31464

"DOCK" button

To engage Dock mode:

1. Place both ERC levers in neutral.
2. Press the "DOCK" button located on the DTS Trackpad attached to the ERC levers.
3. The "DOCK" button light turns on.
4. Place either ERC lever into gear.
5. The engines raise the RPM at a proportionally lower RPM for the ERC lever position, and with half the power that is usually available.

To disengage Dock mode:

NOTE: Dock only disengages with the levers in a detent.

1. Bring both ERC levers to any detent.
2. Press the "DOCK" button. The "DOCK" button light turns off.

THROTTLE ONLY



31465

"THROTTLE ONLY" button

To engage Throttle Only mode:

1. Place both ERC levers in neutral.
2. Press the "THROTTLE ONLY" button, located on the DTS Trackpad.

3. The "THROTTLE ONLY" button light illuminates and the neutral lights blink.
 4. Place either ERC lever into gear.
 5. The RPM of the engines can be raised, while the transmissions remains in Neutral.
- To disengage Throttle Only mode:

NOTE: Pressing the "THROTTLE ONLY" button while the ERC levers are in gear, turns off the button light, but the boat remains in Throttle Only mode until you place the levers in neutral.

1. Bring both ERC levers to neutral. Throttle Only will not disengage unless the ERC levers are in neutral.
2. Press the "THROTTLE ONLY" button. The "THROTTLE ONLY" button light turns off.
3. The neutral lights remains on.

1 (ONE) LEVER

The Zeus system features the ability to command both engines with a single lever. This feature simplifies engine management during rough sea conditions by allowing you to grasp a single lever to command both engines simultaneously.



"1 LEVER" button

To engage 1 Lever mode:

1. Place both ERC levers in neutral.
2. Press the "1 LEVER" button located on the DTS Trackpad attached to the ERC levers.
3. The "1 LEVER" button lights.
4. Place the starboard ERC lever into gear.
5. The engine RPM raises and lowers simultaneously while the transmissions remain in the same gear.

To disengage 1 Lever mode:

1. Place both ERC levers in neutral.
2. Press the "1 LEVER" button. The "1 LEVER" button light turns off.

SYNC

The Zeus system features an automatic engine synchronization, or Sync, feature, which engages automatically at key-up. The synchronization feature monitors the position of both levers. If both levers are within 10% of one another, the port engine synchronizes to the starboard engine's RPM.

VesselView shows an orange icon if the RPM of the engines are not within 10% of each other, and the icon turns green when they synchronize. The icon turns grey when Sync mode is off.



"SYNC" button

To disengage Sync mode:

1. Place the ERC levers in any detent.
2. Press the "SYNC" button.

To re-engage Sync mode, press the "SYNC" button.

Cruise Control

The VesselView system features integrated throttle cruise control (Cruise), which allows the operator to limit the peak RPM of choice below Wide Open Throttle (WOT). VesselView is required for this feature. Refer to the owners and operators manual provided with your VesselView for operation instructions.

These additional notes are exclusive to your package:

- You can change or disengage Cruise through the screen at any time.
- Cruise resets when the key is turned off.
- Skyhook does not function if Skyhook is in effect.
- If the Cruise limit is changed while the levers are at WOT, Cruise gradually changes to the new speed.
- Cruise does not disengage if the ERC levers are at a higher engine speed than the actual RPM. Bring the levers back to the forward detent to disengage.

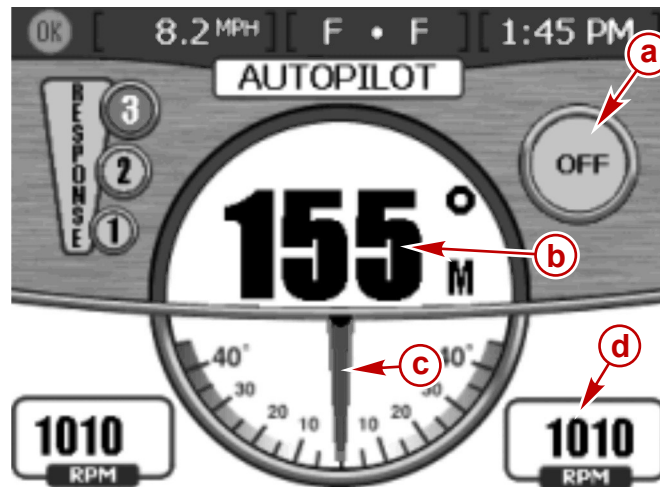
Precision Pilot Track Pad Features

GENERAL INFORMATION

- Precision Pilot (Pilot) functions are controlled through the Pilot track pad only.
- Pilot screens, when accessed by the trackpad, appear on the VesselView for three seconds unless calibrated otherwise.
- Pressing any button on VesselView dismisses the autopilot screen from the VesselView screen, unless the screen was chosen from the VesselView environment menu.
- The "TURN" buttons provide a 10° course correction for each press to the port or starboard.
- The joystick provides a 1° course correction for each press to the port or starboard.

The steering wheel feels locked into a detent when "AUTO" or "TRACK" are engaged. Approximately 3.4–4.5 kg (8–10 lb.) of force are required to overcome this detent. Manually overcoming the steering wheel's detent force automatically puts Pilot into standby mode.

STANDBY



31408

Standby screen on VesselView

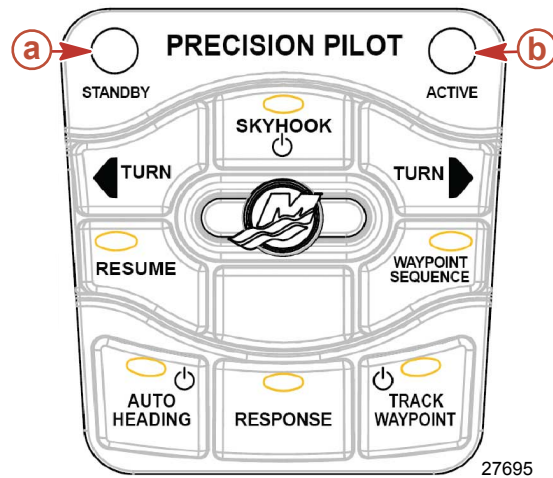
- a** - "OFF" icon
- b** - Heading
- c** - Drive angle reference
- d** - Engine RPM

- In standby mode, the display shows a digital compass value and the angle of the drives when engaged.
- The compass value is the actual current heading from the AutoPilot.
- On the right side of the screen, an icon labeled "OFF" indicates that Pilot is not engaged.

NOTE: Not all of the functions of Precision Pilot work when DTS functions are engaged. Disengage the DTS functions to use the functions of Precision Pilot.

The following information shows the location and explains the function of the Precision Pilot track pad lights and buttons. For more information, refer to the Precision Pilot Owner's Manual provided with the product.

STANDBY AND ACTIVE LIGHTS



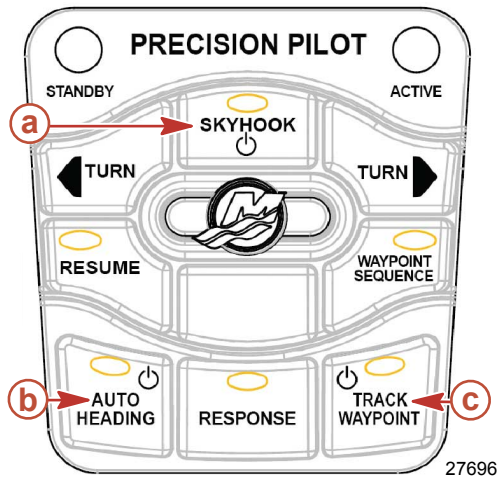
a - "STANDBY" light

b - "ACTIVE" light

Precision Pilot is disengaged (off) when the "STANDBY" light is illuminated. You must press a button to engage a mode.

When the "ACTIVE" light is illuminated one mode of Precision Pilot is engaged (on).

POWER ICON



Buttons with Power Icons

a - "SKYHOOK" button

b - "AUTO HEADING" button

c - "TRACK WAYPOINT" button

The power icon  indicates that these buttons have the ability to engage or disengage the Precision Pilot function they perform.

If you press a button that has the power icon  when that button light is on, the light turns off for that button and the "STANDBY" light illuminates.

If you press a button that has the power icon  when that button light is off, the light turns on for that button, a single beep sounds, and the "ACTIVE" light illuminates, unless another mode is currently active. If another mode is currently active, press the button on the active mode to disengage it, then press the button for the new mode.

If you press a button with the power icon  when that button light is off, the light turns on for that button, a single beep sounds, and the "ACTIVE" light illuminates.

SKYHOOK

WARNING

A rotating propeller, a moving boat, or a device attached to a moving boat can cause serious injury to people in the water. When the Skyhook electronic anchor is engaged, the propellers rotate and the boat moves to maintain the position of the boat. Stop the engines immediately whenever anyone is in the water near the boat.

Your Zeus vessel is equipped with the Skyhook electronic anchor, or Skyhook, which allows the boat to automatically maintain its position and heading. The computer control system maneuvers the drives automatically to keep the boat in one position. Skyhook keeps the boat steady without having to use anchors or lines when no people are present in the water near the boat.

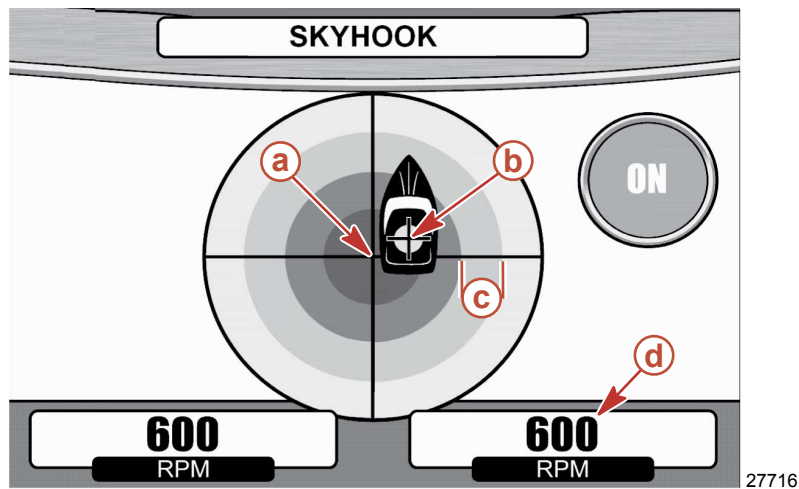
The capability of most vessels limits the ability of Skyhook electronic anchor to counteract currents of up to 2 knots (2.3 MPH) when the boat is sideways to the current. If you notice your boat drifting sideways while Skyhook electronic anchor is engaged, move the bow or stern more directly into the current to help reduce the effects of this situation.

The Skyhook electronic anchor system relies on an operational GPS receiver and operational heading sensor. Occasionally, due to satellite geometry or obstructions, GPS may be temporarily unavailable. Skyhook continues to operate through a GPS outage for up to 10 seconds, but automatically disengages if the GPS outage persists. If disengagement occurs, a horn sounds and the light on the Precision Pilot keypad "SKYHOOK" button turns off.

The Skyhook electronic anchor performance is largely dictated by the performance of the onboard GPS system. The Zeus GPS system is accurate within 3 meters (10 feet) when receiving a Wide Area Augmentation System (WAAS) correction. WAAS is a system of satellites and ground stations that provide GPS signal corrections, allowing for more accurate positioning of your GPS. When WAAS is not available, the performance of the system maintains the boat within 20 meters (60 feet) of the desired position.

We do not recommend Skyhook for close quarter or docking operations.

SKYHOOK SCREEN NOTES

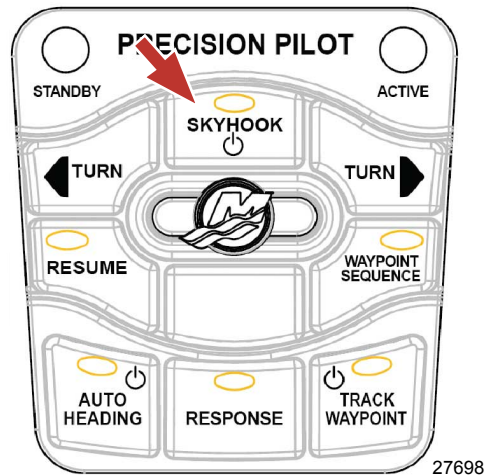


Skyhook screen on VesselView

- a** - Location where Skyhook is set
- b** - Location where boat is relative to set location
- c** - 5 meter gradation
- d** - Engine RPM

- In Skyhook mode the "ON" light illuminates, a single beep sounds, and the display shows engine speed, a target with cross-hairs, and a boat icon.
- The rotation angle of the boat shows the yaw error. Zero yaw error shows the boat pointing upward. Positive yaw error causes the boat to rotate counter-clockwise. Negative yaw error causes the boat to rotate clockwise.
- The horizontal and vertical displacement of the vessel from the cross hairs is proportional to the position error reported by the GPS.
- Each gradation of color in the circular target on the VesselView screen is equivalent to 5 meters of error. If the boat exceeds 20 meters of error, then the boat is located at the edge of the circle. The boat continues to try to correct until Skyhook is disengaged.
- During Skyhook electronic anchor operations, the computer control system shifts the engines and drives automatically. Do not allow people in the water around the boat while Skyhook is engaged. Activities in the water near the vessel while Skyhook is engaged may result in injury.
- A single beep sounds when the Skyhook is disengaged or the GPS signal is lost.

ENGAGING SKYHOOK



"SKYHOOK" button

1. Move the levers to neutral and bring the boat to a stop. Skyhook does not engage until the boat is in neutral and at a speed slow enough for safe engagement. The Skyhook light blinks while the mode is waiting for the boat to decelerate enough to engage. The boat may reverse automatically if it has passed the position where the "SKYHOOK" button was pressed in order to get back to the point it was asked to hold.

⚠ WARNING

When the Skyhook electronic anchor is engaged, the boat stays in a preset position; however, Skyhook can disengage unexpectedly. When Skyhook disengages, the boat does not hold the preset position and may drift, causing the potential of damage or personal injury. The helm operator must be able to take control of the boat when using Skyhook.

2. Press the "SKYHOOK" button to turn on Skyhook mode and a single beep sounds. A warning screen appears on VesselView while Skyhook maintains the boat's current position and heading. . Press the check to acknowledge. The light stops blinking and remains on constantly once Skyhook is engaged.
3. Move the joystick, move the ERC levers, or press the "SKYHOOK" button when illuminated to turn off Skyhook. A single beep sounds when the function turns off.
4. The VesselView "SKYHOOK" screen displays on VesselView for one second after the "SKYHOOK" button is pressed and the screen displays a green circle with "SH" when Skyhook engages. The screen must be turned on in VesselView calibration. See **Mode Display in VesselView**.
5. Press the "SKYHOOK" button a second time to put Precision Pilot in standby. All lights other than "STANDBY" turn off.

DISENGAGING SKYHOOK

IMPORTANT: Under most circumstances, both engines and drives must be operational to achieve acceptable Skyhook electronic anchor performance. If the necessary reference signals from an engine or drive become unavailable, Skyhook automatically disengages. To disengage the Skyhook Electronic Anchor, you can choose one of the following methods:

- Press the "SKYHOOK" button on the Precision Pilot keypad.
- Move any lever out of neutral.

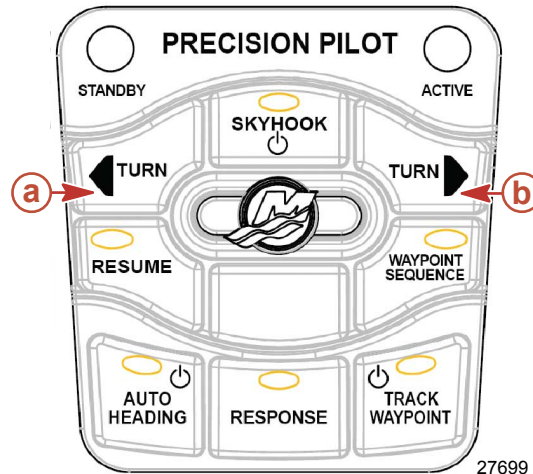
- Operate the boat with the joystick.

NOTE: In each of the methods, the light on the "SKYHOOK" button turns off.

TURN BUTTONS

While in "AUTO HEADING" mode, these buttons respectively change the set heading by a default of 10°. While in the "HEADING" mode, tapping the joystick left or right also adjusts your course by 1° per tap.

1. Press the "TURN" button in the direction of the desired heading change. Each press of the button changes the desired heading by 10°.



a - Port "TURN" button

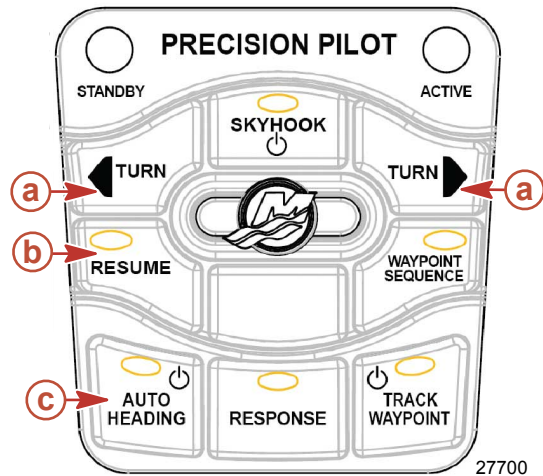
b - Starboard "TURN" button

2. Move (press) the joystick in the desired direction to make small adjustments in the chosen heading. The joystick must move over 50% of its travel for the movement to be recognized as input. Each recognized movement adjusts the chosen heading by 1°.



Adjusting heading to starboard

AUTO HEADING



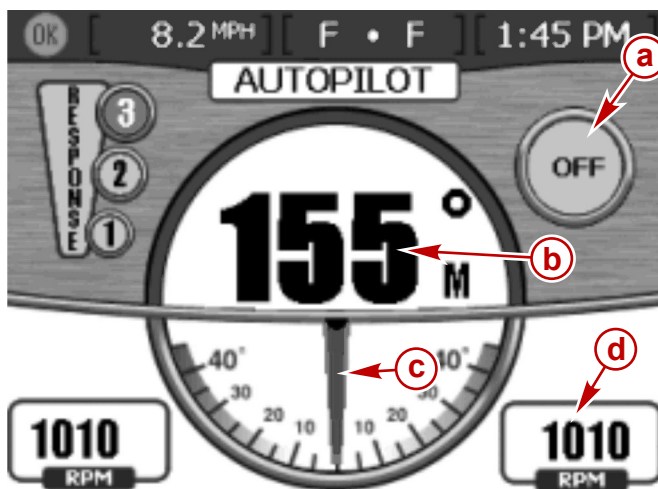
- a - "TURN" buttons
- b - "RESUME" button
- c - "AUTO HEADING" button

1. At least one engine must be running for Auto Heading to function.
2. Press the "AUTO HEADING" button to engage Precision Pilot. The button illuminates and a single beep sounds. A double beep sounds if Auto Heading does not engage. Precision Pilot holds the compass heading the boat following when the "AUTO HEADING" button is engaged.



3. To make adjustments in the default heading while the "AUTO HEADING" is active and the button light is on, press the respective "TURN" button on the trackpad or tap (quickly move) the joystick.
4. To make a turn:
 - Press one of the "TURN" buttons in the direction you want the turn.
 - Tap the joystick in the direction you want the turn. Tapping the joystick left or right adjusts your course by 1° for each movement.

5. Turn the wheel or press the "AUTO HEADING" button to disengage the Auto Heading and a single beep sounds. If the steering wheel is used to disengage Auto Heading, the resume button LED turns on and a single beep sounds. While the LED is lit, you can press the "RESUME" button to resume the course in Auto Heading.
6. If the ERC Handles are moved to neutral, Auto Heading turns off, a single beep sounds, and the "STANDBY" light turns on. You are not able to resume your course by pressing the "RESUME" button.



a - "OFF" button
b - Current heading

31408
c - Drive positions
d - Engine RPM

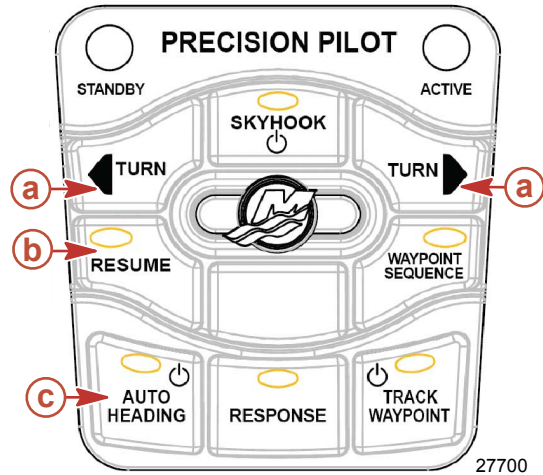
Pressing the "AUTO HEADING" button causes VesselView to display the "AUTO HEADING" screen for three seconds. If the VesselView "AUTO HEADING" screen does not appear, the "AUTO HEADING" screen needs to be activated in VesselView calibration. Precision Pilot still engages whether the screen appears or not.

NOTE: If you press the "AUTO HEADING" button a second time, the pilot goes to Standby mode and all lights other than "STANDBY" turn off.

DISENGAGE AUTO HEADING

1. Disengage the AutoPilot mode by any of the following actions.
 - Place the ERC levers for both engines in neutral.
 - Turn the steering wheel beyond the electronic detent.

- Press the "AUTO HEADING" button on the Precision Pilot keypad. The "AUTO HEADING" button light turns off.



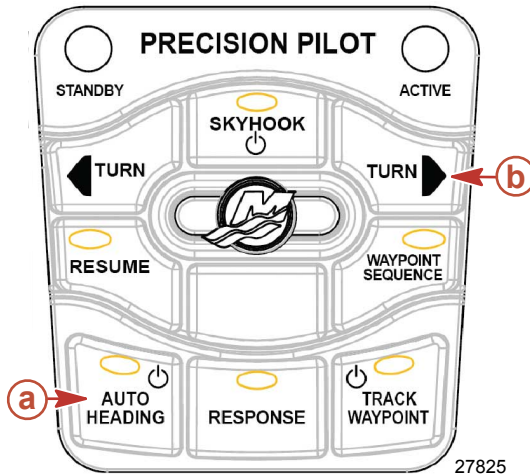
- a** - "TURN" button
- b** - "RESUME" button
- c** - "AUTO HEADING" button

TO RESUME TO A HEADING

The "RESUME" button light turns on if the previous course heading is available to resume. The previous heading can only be resumed within one minute of the AutoPilot being disengaged or if the boat has not turned more than 180°. These numbers can be adjusted. If you disengage the AutoPilot by turning the steering wheel, or if you press one of the "TURN" buttons with AutoPilot still engaged, press the "RESUME" button to resume the previous heading .

1. Place at least one engine in forward gear.
2. Manually steer the boat to the desired heading and hold the boat steady.

- Press the "AUTO HEADING" button on the Precision Pilot keypad. The light on "AUTO HEADING" button illuminates and the system automatically keeps the vessel steering towards the desired course. Press either of the "TURN" buttons or use the joystick to change or adjust the course.



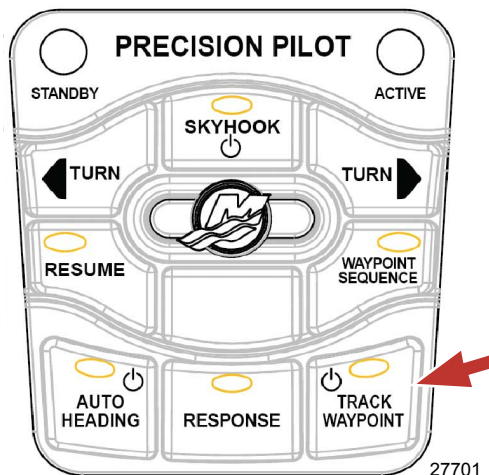
a - "AUTO HEADING" button

b - "TURN" buttons

TRACK WAYPOINT

⚠ WARNING

In some Precision Pilot modes—"Auto Heading," "Track Waypoint," and "Waypoint Sequence"—the boat navigates a preset course. The boat does not automatically respond to hazards such as other watercraft, obstacles, swimmers, or underwater terrain. Collision with these hazards could cause boat damage, serious injury, or death. The operator must stay at the helm, ready to evade hazards and warn others of course changes.



"TRACK WAYPOINT" button

- Move the ERC levers past the forward detent. Track Waypoint does not function if the levers are in neutral or reverse.
- Turn on the chart plotter and select a waypoint. Waypoint data needs to be provided by a third party chart plotter.

3. Press the "TRACK WAYPOINT" button. The "TRACK WAYPOINT" button light turns on, a single beep sounds, and Precision Pilot engages. Pilot begins tracking to a waypoint. Two beeps sounds if Track Waypoint does not engage.
4. The VesselView "TRACK WAYPOINT" screen displays on VesselView for one second after pressing the "TRACK WAYPOINT" button. The screen is activated during VesselView calibration. See Mode Display in VesselView.



31413

Track Waypoint screen

NOTE: Pilot does not turn in waypoint mode. Turn features are only available in Auto Heading mode. The display shows the digital heading that the boat is traveling, the angles of the drives, and engine speed in RPM. The GPS system generates the heading, and is represented from magnetic North.

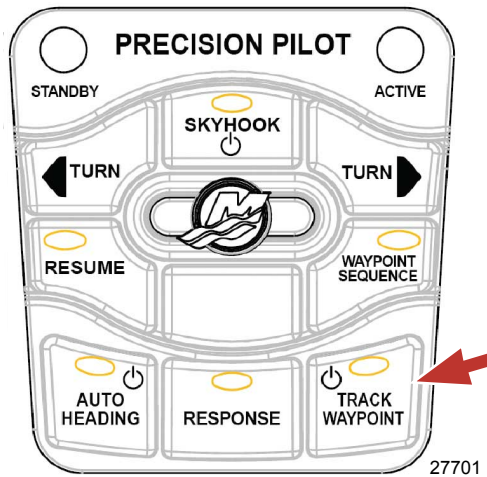
5. Turn the steering wheel, put the ERC levers in neutral, or press the "TRACK WAYPOINT" button a second time to put Pilot in Standby mode. A single beep sounds, the "TRACK WAYPOINT" light turns off, and the "STANDBY" light turns on.
6. You can resume the heading within the time limit, if the vessel has not turned too far and the "RESUME" light is still on or flashing.

ENGAGING TRACK WAYPOINT MODE

To engage Track Waypoint mode of Precision Pilot:

1. Create and use a route from the chart plotter. Refer to your chart plotter user manual for details.
2. Place at least one ERC lever in forward gear and establish a safe operating speed.

3. Press the "TRACK WAYPOINT" button on the Precision Pilot keypad. The "TRACK WAYPOINT" button turns on, indicating that Pilot is tracking to the chart plotter's desired course.



"TRACK WAYPOINT" button

4. A beep sounds, and a warning appears on VesselView. Press the check to acknowledge the warning.

DISENGAGING TRACK WAYPOINT MODE

Disengage the Track Waypoint mode by any one of the following methods:

- Press the "TRACK WAYPOINT" button on the precision pilot keypad. The button light goes off and Pilot goes to Standby.
- Turn the steering wheel hard enough to overcome the force feedback and Pilot goes to Standby.
- Move both ERC levers back to neutral and Pilot goes to Standby.
- Press either "TURN" button and Pilot goes to Auto mode.
- Press the "AUTO HEADING" button and Pilot goes to Auto mode.
- Turn off the chart plotter and Pilot goes to Standby.

TURN BUTTON OR JOYSTICK IN TRACK MODE

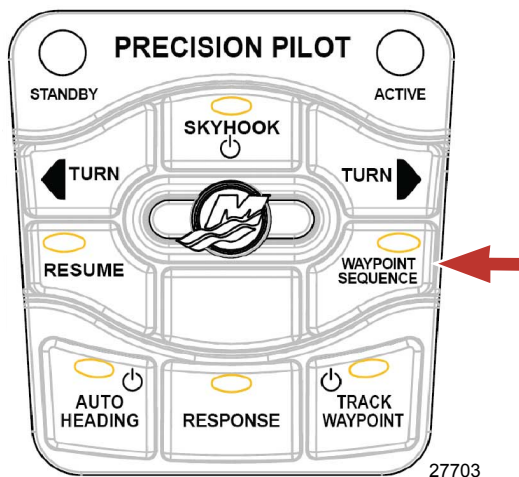
While in "TRACK WAYPOINT" the left and right "TURN" buttons on the keypad or joystick inputs changes the mode to "AUTO HEADING."

AUTO HEADING BUTTON IN TRACK MODE

While in "TRACK WAYPOINT", the "AUTO HEADING" button causes the AutoPilot to change to "AUTO HEADING."

ACKNOWLEDGING A TURN DURING A WAYPOINT ARRIVAL

1. When the boat enters the waypoint arrival zone of the chart plotter, the AutoPilot sounds a short horn alarm and blinks the "WAYPOINT SEQUENCING" button light, informing the operator to make a turn.



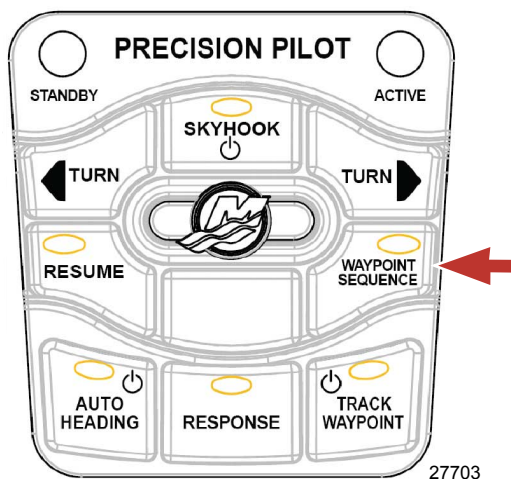
"WAYPOINT SEQUENCE" button

2. The operator must determine it is safe to turn the boat. If so, press the "WAYPOINT SEQUENCE" button to acknowledge that it is safe for the Pilot to turn the boat and maneuver to the new course. If the waypoint is not acknowledged, the boat continues on its current heading.
3. At the end of the Track Waypoint course, input a new route or take control of the boat. Otherwise, the boat reverts to Auto Heading mode and continues on its last course heading.

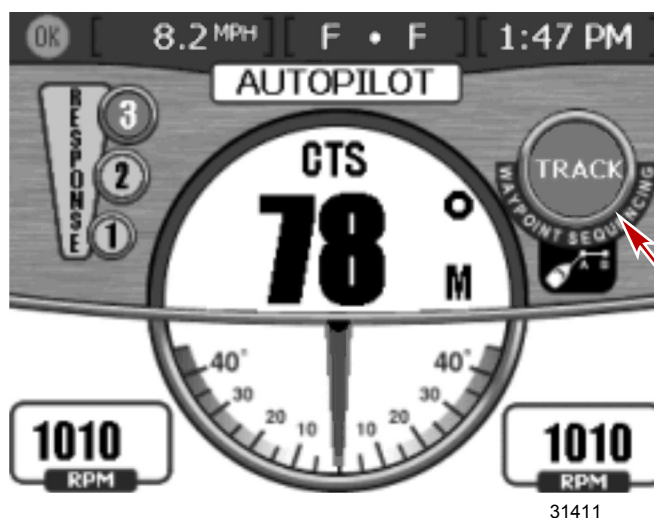
WAYPOINT SEQUENCE

⚠ WARNING

In some Precision Pilot modes—"Auto Heading," "Track Waypoint," and "Waypoint Sequence"—the boat navigates a preset course. The boat does not automatically respond to hazards such as other watercraft, obstacles, swimmers, or underwater terrain. Collision with these hazards could cause boat damage, serious injury, or death. The operator must stay at the helm, ready to evade hazards and warn others of course changes.

**"WAYPOINT SEQUENCE" button**

1. Place the ERC lever or levers into forward. "WAYPOINT SEQUENCE" does not engage if the levers are in neutral or reverse.
2. If not already accomplished, press the "TRACK WAYPOINT" button and note that the button light is on.
3. Press the "WAYPOINT SEQUENCE" button:



IMPORTANT: Stay alert. The boat turns automatically in this mode. The operator must be aware if the boat is in a safe area to turn when the vessel is entering a waypoint arrival zone and inform passengers that the boat automatically turns so they can be prepared.

- If you are in the waypoint arrival zone set by the chart plotter, "WAYPOINT SEQUENCE" only informs Pilot it is OK to proceed to next waypoint. It acts as a waypoint acknowledge function and Pilot beeps when in the zone. The operator must acknowledge that it is OK to turn by pressing the Waypoint Acknowledge button on the VesselView screen. Once acknowledged, Pilot tracks to the next waypoint in the route.



31414

- If you are not in the waypoint arrival zone, set by third party chart plotter interfaced to Pilot, "WAYPOINT SEQUENCE" engages auto sequencing to the waypoints in the route. You must acknowledge the warning screen by pressing the check button.



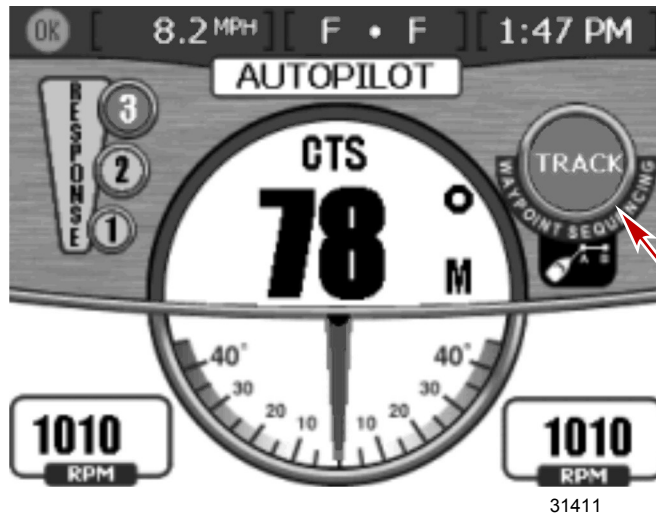
31412

4. Press the "TRACK WAYPOINT" button, and the VesselView Track screen displays for three seconds, the "WAYPOINT SEQUENCE" button light turns on, and a single beep sounds.
5. The Track Screen does not appear unless the screen is activated (turned on) during VesselView calibration. Pilot engages whether the screen is on or not. See Mode Display in VesselView.
6. Press the "TRACK WAYPOINT" button a second time to put the Pilot in Standby mode. All lights other than "STANDBY" turn off.

WAYPOINT ACKNOWLEDGE

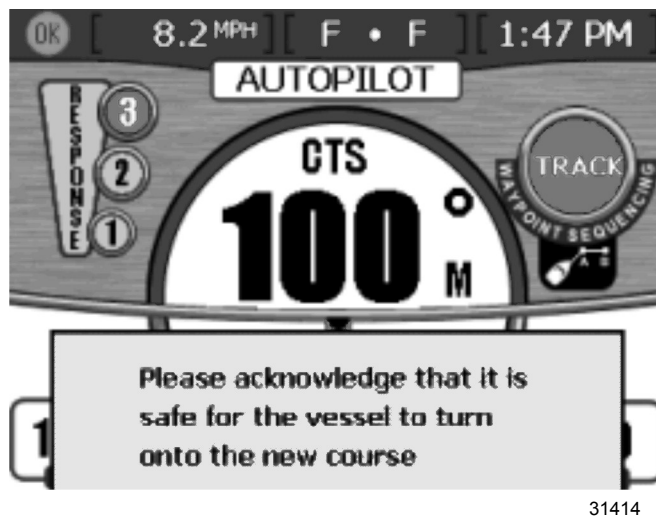
- The Track Waypoint mode does not automatically turn the boat upon the arrival at a waypoint. Turns are controlled in the Auto Heading mode.

- Pressing the "WAYPOINT SEQUENCE" button during Track Waypoint mode, but not at the arrival waypoint, causes the AutoPilot to continue to the next waypoint.
- The "WAYPOINT SEQUENCE" light continuously illuminates. The VesselView icon is shown when in AutoPilot mode.



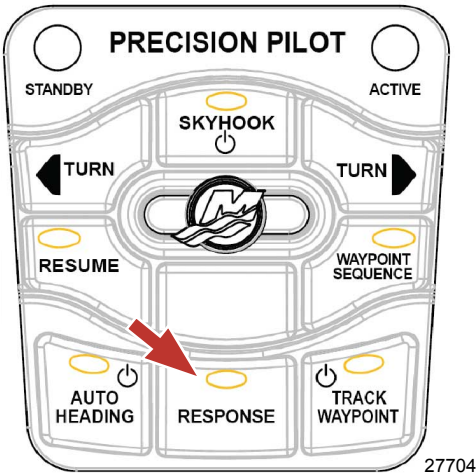
Waypoint acknowledge screen

- In Track Waypoint mode, if the Waypoint Sequence mode has not been engaged, the "WAYPOINT SEQUENCE" light blinks at the arrival alarm, the AutoPilot controls the vessel to the most recent heading setpoint, and VesselView displays a pop-up screen.



Pop-up screen warning

RESPONSE BUTTON



Response button

- 1. Press the "RESPONSE" button to change the gain for Auto Pilot or Waypoint modes.
- 2. Press the "RESPONSE" button again to change the gain further. Each time you press the "RESPONSE" button, the button light blinks to show you the gain setting for that mode. The initial button press shows the current setting value. Additional button presses increase the gain in steps up to three and then return to one.

Number of blinks	Response setting shown	Aggressiveness of correction
1	1	Mild (for gentle or calm conditions)
2	2	Medium (for moderate conditions)
3	3	Aggressive (for severe conditions)

- 3. The screen of the mode you are in is displayed, as well as the response popup dedicated to that mode on the VesselView for 3 seconds, once the button is pressed. The screen needs to be turned on in VesselView calibration. See **Mode Display in VesselView**.

CHANGING VESSELVIEW MODE DISPLAY TIMES

All modes (Auto Heading, Track Waypoint, and Skyhook) display a screen on VesselView for three seconds by default. The length of time that a screen is visible in VesselView can be changed from no display at all, display up to 10 seconds, or display the screen until changed.

To change the display time:

- 1. Open VesselView.
- 2. Select Setting.
- 3. Select Screen Options.
- 4. Select the mode you want to change.
- 5. Select the time option.
- 6. Press x to exit.

End of First Season Checkup

At the end of the first season of operation, contact an Authorized Cummins MerCruiser Diesel Repair Facility to discuss or perform scheduled maintenance items. See **Section 5** if you are in an area where the product is operated continuously, year-round, contact your Authorized Cummins MerCruiser Diesel Repair Facility at the end of the first 500 hours of operation or once yearly, whichever occurs first.

Contingent Operations

Backup Steering System

If the electronic steering wheel ceases to operate, the control system automatically monitors the joystick for steering commands. When in gear, left and right movement of the joystick corresponds to left and right steering of the wheel. When in neutral, the joystick returns to normal operation.

Port Engine Only Operation

The force feedback feature of the steering wheel is only available when the starboard key switch is in the on position. If the starboard key switch is off or there has been damage to the starboard electrical system, the steering wheel will be monitored by the port control system.

However, if only the port side is operational, or only the port key switch is in the on position, the steering wheel will not have end stops provided by the force feedback system. In this case, the drive will always turn in the direction that the steering wheel is being rotated until the mechanical limits of the drive are reached. If there is damage to the port electrical system, the steering wheel will operate normally with complete force feedback and end stops.

The boat can operate as a single-engine vessel. Note that joystick and station keeping are not available in this condition. However, Zeus features redundant AutoPilot systems, so Auto Heading and Track Waypoint mode are still available during single-engine operation.

Gear Engagement—Emergency Procedure

If a transmission or electrical system is damaged or has experienced a condition resulting in a fault such that a transmission does not respond to the helm controls, it is possible to manually engage a gear. In an emergency you can manually place a transmission into gear by using a suitable wrench to actuate the appropriate gear shifting solenoid.

Note the following:

- It is better to use one drive that works properly than locking and operating the drive that is not functioning properly. This procedure is for when both drives are not responding to helm control.
- Auto Heading and Track Waypoint will work when emergency gear engagement is in use.
- Moving the ERC handle into reverse stops the engine.

CAUTION

Locking the transmission in gear using the emergency procedure renders the helm's shifting control inoperable. Drive carefully with the gear lock engaged. To shift out of gear, turn the key switch to "OFF."

1. Determine the transmission that is not engaging a gear.
2. Stop the engines and remove the key from the key switch.

WARNING

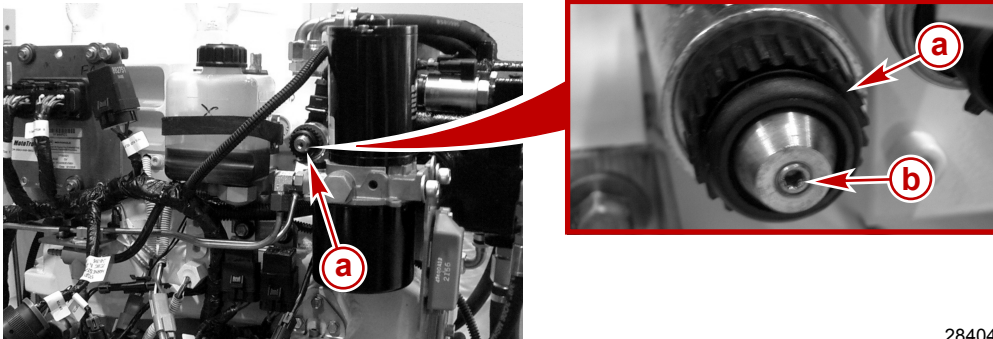
Engine components and fluids are hot and can cause serious injury or death. Allow the engine to cool before removing any components or opening any fluid hoses.

3. Remove the drive cover of the affected transmission. Refer to **Section 5—The Drive Cover**.

4. Locate the forward gear solenoid on the port side of the affected transmission (the wire is tagged "Forward Gear").

NOTE: Do not disturb the reverse gear solenoid on the starboard side of the transmission (the wire is tagged "Reverse Gear").

5. Using a 3 mm hex-head wrench, turn the solenoid screw in the center of the top of the forward gear solenoid clockwise until it stops.
6. The transmission is now manually engaged in the gear and will not respond to the helm controls for shifting in and out of that gear.



28404

a - Forward gear solenoid
b - Solenoid screw

⚠ WARNING

A spinning propeller, a moving boat, or any solid device attached to the boat can cause serious injury or death to swimmers. Stop the engine immediately whenever anyone in the water is near your boat.

7. Ensure that the area around the propellers is clear before starting the engine since the propeller will be turning whenever the engine is operating.

IMPORTANT: The engine does not start with the ERC lever in gear, even though the drive is manually engaged in a gear.

8. When you are ready to start the engine, position the ERC lever in neutral gear before turning the key switch to the start position.

NOTE: Due to the extra load of turning the drive gears and propeller, the starter may turn slower when starting the engine connected to the drive in the emergency setting.

9. Use extra care and caution when operating your boat in this emergency mode. On the drive with the manually engaged gear, you must turn that engine off to stop the propeller from turning or providing thrust.

NOTE: Putting the drive with the gear manually engaged into reverse stops the engine.

10. Immediately take your boat to an Authorized Cummins MerCruiser Diesel Repair Facility and inform them that the drive gear has been manually engaged.

Section 4 - Specifications

Table of Contents

Drive Gear Lubricant.....	62	Approved Paints.....	62
Transmission.....	62	Approved Lubricants.....	62
Steering Actuator and Trim Fluid.....	62		

Drive Gear Lubricant

Model	Fluid Capacity (includes the drive and the gear lube monitor)	Fluid Type	Fluid Part Number
Zeus	5-1/4 liters (5-1/2 quarts)	High Performance Gear Lube	92-858065Q01

Transmission

IMPORTANT: Always use the dipstick to determine the exact quantity of lubricant or fluid required.

Transmission With Drop Box

Description	Fluid Capacity	Fluid Type	Fluid Part Number
Transmission and drop box	5-1/4 liters (5-1/2 quarts)	Synthetic Power Steering Fluid SAE 0W-30	92-858077K01

Transmission Without Drop Box

Description	Fluid Capacity	Fluid Type	Fluid Part Number
Transmission only	4 liters (4-1/4 quarts)	Synthetic Power Steering Fluid SAE 0W-30	92-858077K01

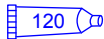
Steering Actuator and Trim Fluid

Description	Fluid Capacity	Fluid Type	Fluid Part Number
Steering actuator and trim system	5-3/4 to 6 liters (6 to 6-1/3 quarts)	Synthetic Power Steering Fluid SAE 0W-30	92-858077K01

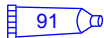
Approved Paints

Description	Part Number
Marine Cloud White (CMD part number: 40918660)	Obtain locally
Mercury Light Gray Primer	92-80287852
Mercury Phantom Black	92-802878Q1

Approved Lubricants

Tube Ref No.	Description	Where Used	Part No.
 120	Corrosion Guard	Drive exterior surfaces	92-802878-55

Tube Ref No.	Description	Where Used	Part No.
 42	U-joint and Gimbal Bearing Grease	Driveshaft slip-joint	92-802870A1

Tube Ref No.	Description	Where Used	Part No.
 91	Engine Coupler Spline Grease	Driveshaft slip-joint	92-802869A1

Tube Ref No.	Description	Where Used	Part No.
 94	Anti-Corrosion Grease	Seacock and propeller shafts	92-802867Q 1

Notes:

Section 5 - Maintenance

Table of Contents

Product Responsibilities.....	66	Battery.....	87
Owner and Operator Responsibilities.....	66	Gauges.....	87
Dealer Responsibilities.....	66	Checking Gauges.....	87
Do-It-Yourself Maintenance Suggestions.....	66	Cleaning Gauges.....	87
Inspection.....	67	Electrical System.....	87
Drive Cover.....	67	Cooling System and Exhaust System.....	87
Removing the Drive Cover.....	67	Lubrication.....	88
Cleaning and Inspecting the Drive Cover.....	68	Driveshaft Slip-Joint	88
Installing the Drive Cover.....	68	Seacock—Seawater Return (Overboard)....	89
Maintenance Schedules.....	69	Propeller Shaft.....	90
Application.....	69	Corrosion Protection.....	90
Routine Maintenance.....	69	Anodes and MerCathode System	90
Scheduled Maintenance.....	69	Reference Electrode Wire of the MerCathode	
Maintenance Log.....	70	System.....	91
Drive Gear Lube.....	72	MerCathode Anode.....	92
Checking.....	72	Checking	92
Filling.....	73	Replacing	92
Changing.....	74	MerCathode System Testing.....	92
With the Boat in the Water	74	Trim Tab Anodes.....	93
With the Boat Out of the Water	77	Checking	93
Steering Actuator and Trim Fluid.....	79	Replacing	93
Checking.....	79	Continuity Circuits.....	93
Filling.....	80	Inhibiting Corrosion.....	94
Changing.....	80	Painting the Boat.....	94
Transmission Fluid.....	81	Propellers.....	95
Checking.....	81	Propeller Removal.....	95
Filling.....	82	Propeller Repair.....	97
Changing.....	83	Propeller Installation.....	97
Seawater Strainer.....	86		

Product Responsibilities

Owner and Operator Responsibilities

It is the operator's responsibility to perform all safety checks, to ensure that all lubrication and maintenance instructions are complied with for safe operation, and to return the unit to a Cummins MerCruiser Diesel Authorized Repair Facility for a periodic checkup.

Normal maintenance service and replacement parts are the responsibility of the owner or operator and as such, are not considered defects in workmanship or material within the terms of the warranty. Individual operating habits and usage contribute to the need for maintenance service.

Proper maintenance and care of your power package will ensure optimum performance and dependability and will keep your overall operating expenses at a minimum. See your Cummins MerCruiser Diesel Authorized Repair Facility for service aids.

Dealer Responsibilities

In general, a dealer's responsibilities to the customer include predelivery inspection and preparation such as:

- Make certain that the power package and other equipment are in proper operating condition before delivery.
- Make all necessary adjustments for maximum efficiency.
- Explain and demonstrate the operation of the power package and boat.
- Provide you with a copy of a Predelivery Inspection Checklist.
- Fill out the Warranty Registration Card completely and mail it to the factory immediately upon sale of the new product. All power packages must be registered for warranty purposes.

Do-It-Yourself Maintenance Suggestions

Present-day marine equipment, such as your Cummins MerCruiser Diesel power package, are highly technical pieces of machinery. Special fuel delivery systems provide greater fuel economies, but also are more complex for the untrained mechanic.

If you are one of those persons who likes to do it yourself, here are some suggestions for you.

- Do not attempt any repairs unless you are aware of the Cautions, Warnings, and procedures required. Your safety is our concern.
- If you attempt to service the product yourself, we suggest you order the service manual for that model. The service manual outlines the correct procedures to follow. It is written for the trained mechanic, so there may be procedures you do not understand. Do not attempt repairs if you do not understand the procedures.
- There are special tools and equipment that are required to perform some repairs. Do not attempt these repairs unless you have these special tools and equipment. You can cause damage to the product in excess of the cost a dealer would charge you.
- Also, if you partially disassemble an engine or drive assembly and are unable to repair it, the dealer's mechanic must reassemble the components and test to determine the problem. This will cost you more than taking it to the dealer immediately upon having a problem. It may be a very simple adjustment to correct the problem.
- Do not telephone the dealer, service office, or the factory to attempt for them to diagnose a problem or to request the repair procedure. It is difficult for them to diagnose a problem over the telephone.

Your local Cummins MerCruiser Diesel Authorized Repair Facility is there to service your power package. They have qualified factory-trained mechanics.

It is recommended you have the Cummins MerCruiser Diesel Authorized Repair Facility do periodic maintenance checks on your power package. Have them winterize it in the fall and service it before the boating season. This will reduce the possibility of any problems occurring during your boating season when you want trouble-free boating pleasure.

Inspection

Inspect your power package often and at regular intervals to help maintain top operating performance and correct potential problems before they occur. Check the entire power package carefully, including all accessible engine and drive parts. For engine inspection information, refer to the **Marine Recreational High Output Propulsion Units QSB and QSC Operation and Maintenance Manual** appropriate for your engine.

1. Check for loose, damaged, or missing parts, hoses, and clamps. Tighten or replace as necessary.
2. Check electrical connections and leads for damage.
3. Remove and inspect the propellers. If nicked, bent, or cracked, contact your Cummins MerCruiser Diesel Authorized Repair Facility.
4. Repair nicks and corrosion damage on the power package exterior finish. Contact your Cummins MerCruiser Diesel Authorized Repair Facility.

The Zeus drive cover protects and separates some components after the drive is installed. The drive cover provides added protection against damage to the hoses and other components as a result of mechanical hose abrasion during operation or damage to the hoses, such as being stepped on during service or maintenance. Keep the drive cover installed at all times, unless removal is necessary during some maintenance inspections and procedures.



Rear view of typical drive cover

- a** - Top cover
- b** - Starboard side cover
- c** - Port side cover

When it is necessary to remove the drive cover, see **Drive Cover**.

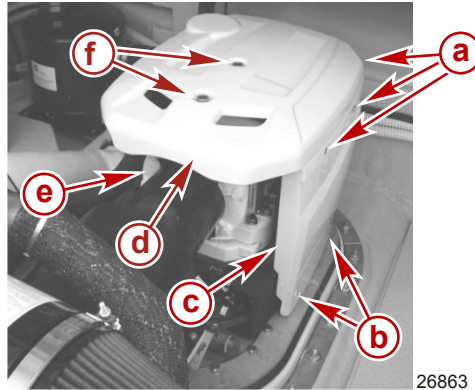
Drive Cover

Removing the Drive Cover

NOTE: The top of the drive cover contains an access panel which provides access to the fill cap on the gear lube monitor and the transmission fluid dipstick without removing the entire cover.

1. Remove the three upper screws (port and starboard) holding the side cover to the top cover.

2. Remove the two lower screws holding the port side cover to the center section.
3. Remove the one lower screw holding the starboard side cover to the center section.
4. Remove the two side covers
5. Remove the two top screws.
6. Lift and remove the top of the drive cover.



Typical drive cover

- a** - Upper screw (6)
- b** - Lower screw (4)
- c** - Port side cover
- d** - Top of the drive cover
- e** - Starboard side cover
- f** - Top screw (2)

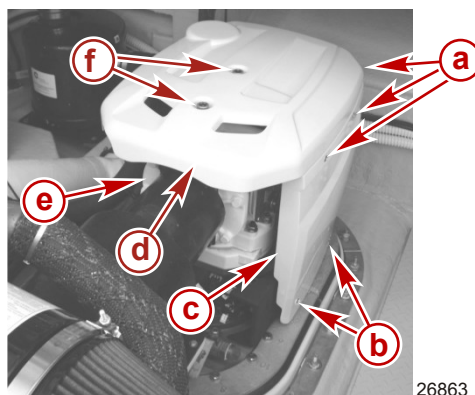
Cleaning and Inspecting the Drive Cover

1. Clean and wax the cover assembly often using marine cleaners and waxes.
2. Inspect the individual cover parts for cracks or damage; replace if cracked or damaged.

Installing the Drive Cover

1. Remove and retain the two lifting rings, if installed.
2. Carefully install the top of the drive cover. Align the top with the two threaded holes in the transmission where lifting rings were removed.
3. Install the two upper screws.
4. Install the starboard side cover and the three upper screws and one lower screw.
5. Install the port side cover and the three upper and two lower screws.

6. Tighten all screws securely.



Typical drive cover

- a** - Upper screw—port shown
- b** - Lower screw—port shown
- c** - Port side cover
- d** - Top of the drive cover
- e** - Starboard side cover
- f** - Top screw

Maintenance Schedules

Application

The following schedules apply to the Zeus drive and driveshaft connection, not to the Cummins engine. For the engine maintenance schedule and procedures, refer to the **Marine Recreational High Output Propulsion Units QSB and QSC Operation and Maintenance Manual** available from the manufacturer of the engine.

NOTE: In the maintenance lists, the word check means to visually inspect and then accordingly, correct, replace, or repair the task item.

Routine Maintenance

Task Interval	Maintenance to be Performed
Each Day Start and When Refueling	- Check the steering actuator and trim tab fluid level. - Check the gear lube level in the gear lube monitor. - Check the transmission fluid level.
Every Two Months of Operation	- Check the battery connections and fluid level. - Treat the power package components inside the boat with Corrosion Guard to protect the product from corrosion. - Ensure that the gauges and the wiring connections are secure. Clean the gauges (every two months or every 50 hours, whichever occurs first. If operating in saltwater, the interval is reduced to every 25 hours or 30 days, whichever occurs first).

Scheduled Maintenance

Task Interval	Maintenance to be Performed
After the First 25 Hours and not to Exceed 30 Hours	Change the transmission fluid and filter, including the transmission fluid in the drop box, if equipped.

Task Interval	Maintenance to be Performed
Every 250 hours of Operation or Once a Year (Whichever Occurs First)	• Torque the driveshaft connecting bolts and nuts. • Inspect and lubricate the driveshaft slip-joint. • Change the gear lube in the drive gearcase. • Change the transmission fluid and filter, including the transmission fluid in the drop box, if equipped. • Lubricate and inspect the seacock for engine seawater return (seawater overboard). Ensure that the seacock opens and closes freely.
Every 500 Hours or Once a Year (Whichever Occurs First)	• Change the steering actuator fluid and filter. • Lubricate the propeller shaft splines and torque the propeller nuts. • Inspect the hydraulic system fittings and hoses found on the drive for leaks or damage. Check the hose fittings for tightness. • Check the bonding (continuity) circuit for loose or damaged connections. Test the MerCathode® unit output. • Inspect the electrical system for loose, damaged, or corroded fasteners. Check for loose, damaged or corroded wiring and connectors. • Inspect the cooling system components found on the drive for damage or leaks. Check the hose clamps on the hoses for tightness. • Inspect the exhaust system connections on the drive for damage or leaks. Check the hose clamps on the hoses for tightness. • Treat the power package components inside the boat with Corrosion Guard to protect the product from corrosion.

Maintenance Log

Record all maintenance performed on your power package here. Be sure to save all work orders and receipts.

Drive Gear Lube

NOTICE

Discharge of oil, coolant, or other engine/drive fluids into the environment is restricted by law. Use caution not to spill oil, coolant, or other fluids into the environment when using or servicing your boat. Be aware of the local restrictions governing the disposal or recycling of waste, and contain and dispose of fluids as required.

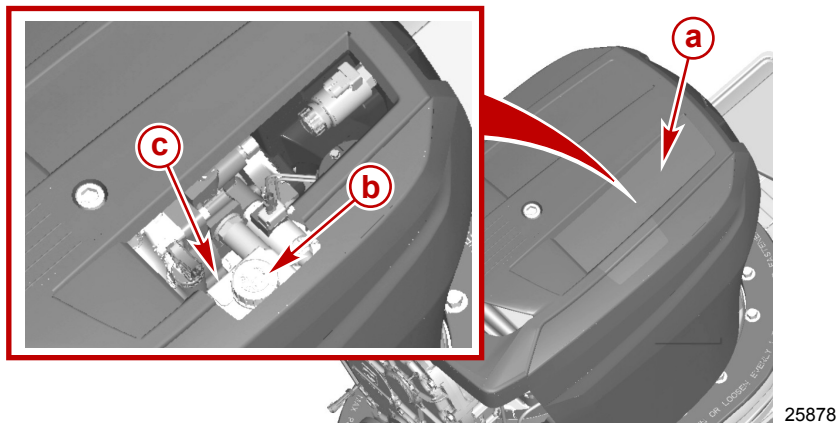
Checking

IMPORTANT: The gear lube level in the gear lube monitor rises and falls during drive operation. Check the gear lube level when the drive is cool and the engine is off.

NOTE: After the drive has been operated and the gear lube is hot, the fluid expands and may be up to the "MAX OPERATING LEVEL" (hot full line).

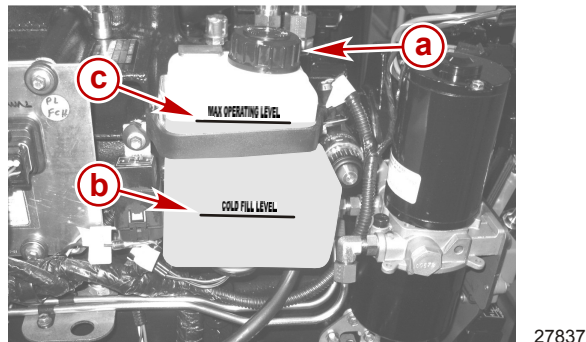
To check the drive gear lube with the drive cover installed:

1. Remove the access cover from the drive cover.
2. Remove the cap from the gear lube monitor.



- a - Access cover
- b - Cap
- c - Gear lube monitor

3. Inspect the gear lube level in the gear lube monitor. The gear lube level should be at the "COLD FILL LEVEL" (cold full line).



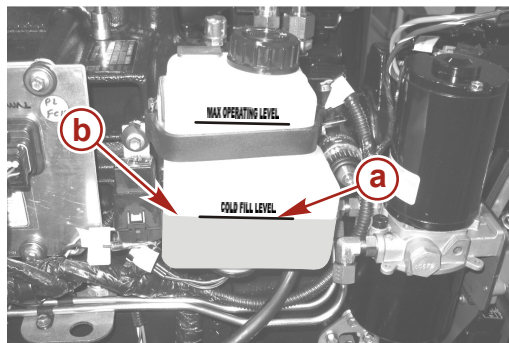
Shown with drive cover removed

- a - Cap
- b - "COLD FILL LEVEL" line
- c - "MAX OPERATING LEVEL" line

4. If the level is low, see **Filling**.
5. If the level is correct, install the access cover.

To check the drive gear lube with the drive cover removed:

1. Remove the drive cover. See **Removing the Drive Cover**.
2. Inspect the gear lube level in the gear lube monitor. The gear lube level should be at the "COLD FILL LEVEL" (cold full line) when the drive and fluid are cold.



27853

- a** - "COLD FILL LEVEL" line
b - Gear lube level

IMPORTANT: If any water is visible at the bottom of the gear lube monitor or appears at the fill and drain plug hole, or if the gear lube appears discolored, contact your Cummins MerCruiser Diesel Authorized Repair Facility immediately. Both conditions may indicate a water leak in the drive.

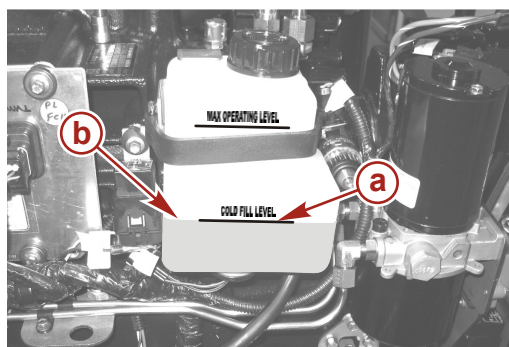
3. If the level is low, see **Filling**.
4. If the level is correct, install the drive cover. See **Installing the Drive Cover**.

Filling

IMPORTANT: If more than 59 mL (2 fl. oz.) of High Performance Gear Lube is required to fill the gear lube monitor, a seal may be leaking. Lack of lubrication will damage the drive. Contact your Cummins MerCruiser Diesel Authorized Repair Facility .

If the gear lube level is below the "COLD FILL LEVEL" line, add the specified gear lube.

1. Remove the cap from the gear lube monitor.
2. Fill the gear lube monitor with the specified gear lube so that the gear lube is level with the "COLD FILL LEVEL" line (cold full line). Do not overfill.



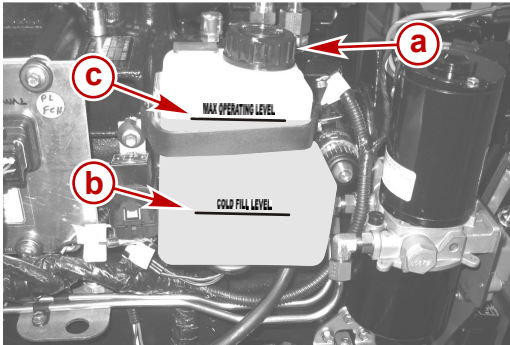
27853

Shown with drive cover removed

- a** - "COLD FILL LEVEL" line
b - Gear lube level

Tube Ref No.	Description	Where Used	Part No.
 87	High Performance Gear Lube	Gear lube monitor	92-858064K01

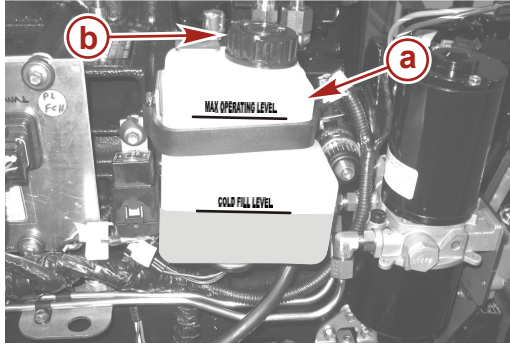
NOTE: After the drive has been operated and the gear lube is hot, the fluid expands and may be up to the "MAX OPERATING LEVEL" line (hot full line).



27837

- a - Cap
- b - "COLD FILL LEVEL" line
- c - "MAX OPERATING LEVEL" line

3. Ensure that the rubber gasket is inside the cap for the gear lube monitor and install the cap. Do not overtighten.



27851

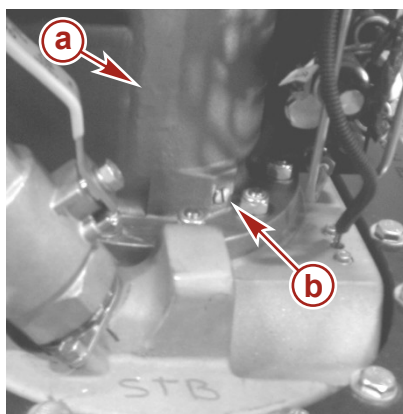
- a - Gear lube monitor
- b - Cap

Changing
WITH THE BOAT IN THE WATER

NOTE: Change the drive gear lubricant when the drive is at operating temperature. Warmer lubricant flows more freely, carrying away more impurities and is easier to remove from the drive.

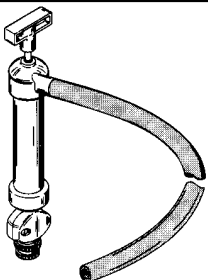
1. Place oil-absorbent wipes or material around the area to contain any spilled lubricant.

- Remove the fill and drain screw from the steering actuator.

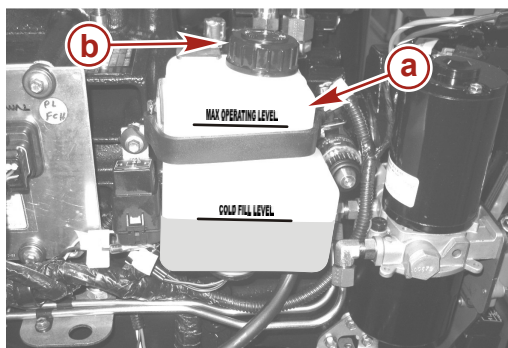


- a** - Steering actuator
b - Fill and drain screw

- Quickly install an adaptor or suitable threaded fitting into the threaded hole of the drain and fill screw and attach a crankcase oil pump.

Crankcase Oil Pump	91-90265A 5
	Aids in the removal of drive oil without draining the drive.

- Remove the gear lube monitor cap.



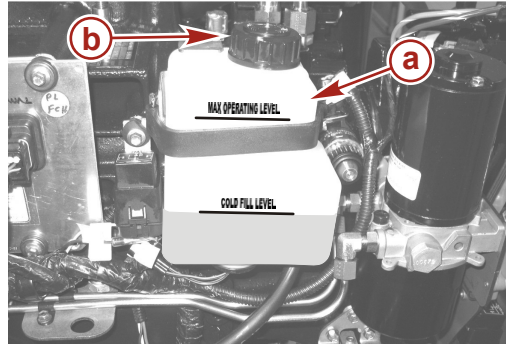
- a** - Gear lube monitor
b - Cap

- Remove the gear lube by pumping the crankcase oil pump from the drive into a suitable container.

IMPORTANT: If any water exits the fill and drain hole, or if the gear lube appears milky, the drive is leaking. Contact your Cummins MerCruiser Diesel Authorized Repair Facility immediately.

- Remove the crankcase oil pump.

7. Ensure that the rubber gasket is inside the cap for the gear lube monitor and install the cap. Do not overtighten.



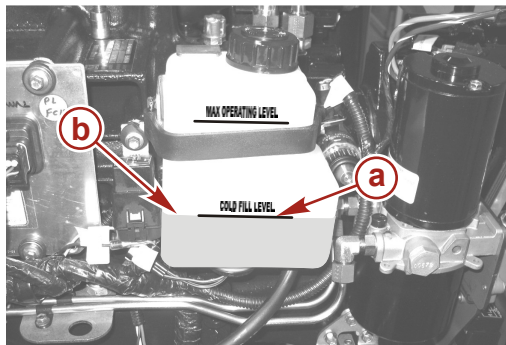
27851

- a - Gear lube monitor
- b - Cap

8. Install a suitable gear lube pump into the fill and drain hole of the steering actuator and begin to fill the drive with the specified gear lube.

IMPORTANT: Use only Mercury or Quicksilver High Performance Gear Lube in the drive.

9. Continue to pump gear lube into the drive until the gear lube appears in the gear lube monitor at the "COLD FILL LEVEL" line. Do not overfill.



27853

- a - "COLD FILL LEVEL" line
- b - Gear lube level

Drive Model	Fluid Capacity includes the Sterndrive and the Gear lube Monitor	Fluid Type	Fluid Part Number
Zeus	5.2 liters (5.5 quarts)	High Performance Gear Lube	92-858065Q01

10. Remove the gear lube pump and quickly reinstall the steering actuator fill and drain washer and screw. Torque the fill and drain screw.

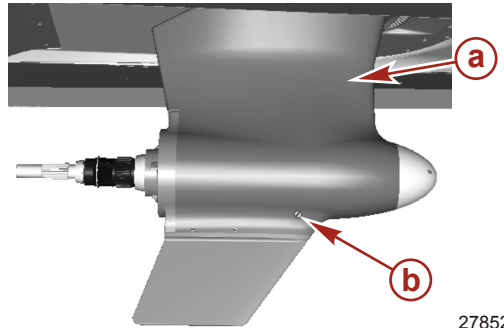
Description	Nm	lb. in.	lb. ft.
Steering actuator fill and drain screw	6.7	60	—

11. See **Filling** and fill the gear lube monitor to the "COLD FILL LEVEL" line, if the level is low.
12. Recheck the gear lube level at the gear lube monitor after the first use. See **Checking**.

IMPORTANT: The gear lube level in the gear lube monitor rises and falls during drive operation; always check the gear lube level when the drive is cool and the engine is shut down.

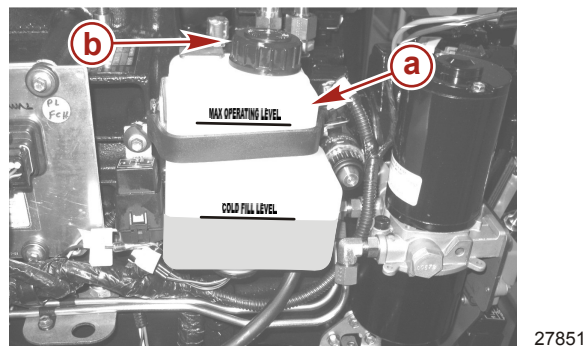
WITH THE BOAT OUT OF THE WATER

1. Remove the drive propellers. See **Propellers**.
2. Remove the gearcase fill and drain screw and sealing washer.



- a** - Gearcase
b - Fill-drain screw and sealing washer

3. Remove the gear lube monitor cap.



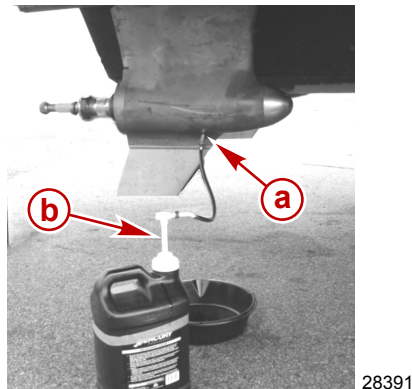
- a** - Gear lube monitor
b - Cap

4. Drain the gear lube into a suitable container.
5. Allow the gear lube to drain completely.

IMPORTANT: If any water exits the fill and drain hole, or if the gear lube appears milky, the drive is leaking. Contact your Cummins MerCruiser Diesel Authorized Repair Facility immediately.

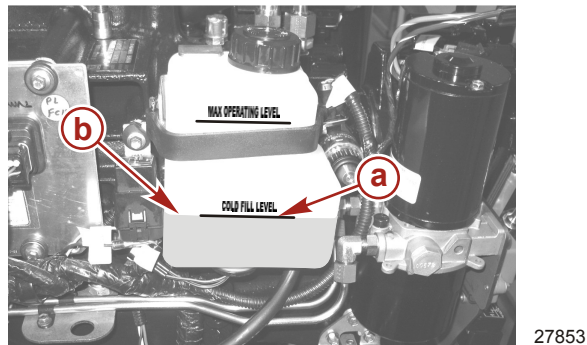
IMPORTANT: Use only Mercury or Quicksilver High Performance Gear Lube in the drive.

6. Install a suitable gear lube pump into the gearcase fill and drain hole. Fill the drive with the specified gear lube.



- a** - Fill and drain hole
b - Gear lube and pump

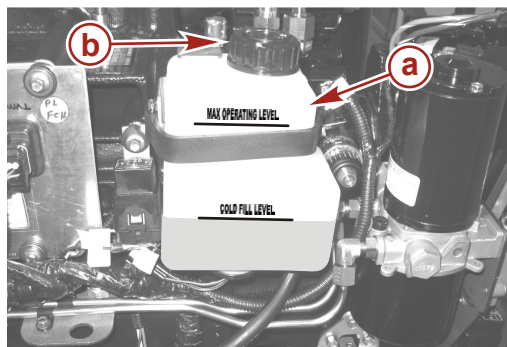
7. Continue to pump gear lube into the drive until the gear lube appears in the gear lube monitor at the "COLD FILL LEVEL" line. Do not overfill.



- a** - "COLD FILL LEVEL" line
b - Gear lube level

Drive Model	Fluid Capacity includes the Sterndrive and the Gear lube Monitor	Fluid Type	Fluid Part Number
Zeus	5.2 liters (5.5 quarts)	High Performance Gear Lube	92-858065Q01

8. Ensure that the rubber gasket is inside the cap for the gear lube monitor and install the cap. Do not overtighten.



27851

- a** - Gear lube monitor
b - Cap

9. Remove the gear lube pump and quickly reinstall the gear case fill and drain screw and washer.

Description	Nm	lb. in.	lb. ft.
Gear case fill and drain screw	6.7	60	—

10. See **Filling** and fill the gear lube monitor to the "COLD FILL LEVEL" line, if the level is low.
11. Install the drive propellers. See **Propellers**.
12. Check the gear lube level at the gear lube monitor after the first use. See **Checking**.

NOTE: After the drive has been operated and the gear lube is hot, the fluid will expand and may be up to the "MAX OPERATING LEVEL" line (hot full line).

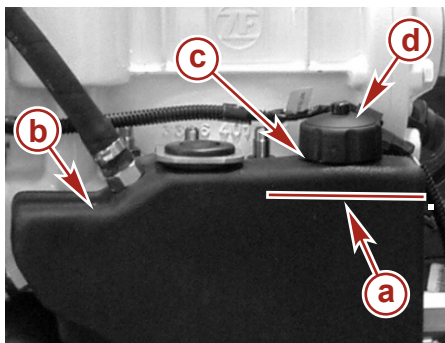
Steering Actuator and Trim Fluid

The steering actuator and trim system use a common hydraulic pump and fluid storage reservoir for the combined lubrication and hydraulic fluid.

Checking

1. Using a clean, lint-free cloth, wipe the dirt and debris away from the cap and exterior of the steering actuator and trim fluid reservoir.
2. Remove the cap.

3. Inspect the fluid level, which should be 25 mm (1 in.) below the bottom of the filler neck of the reservoir.



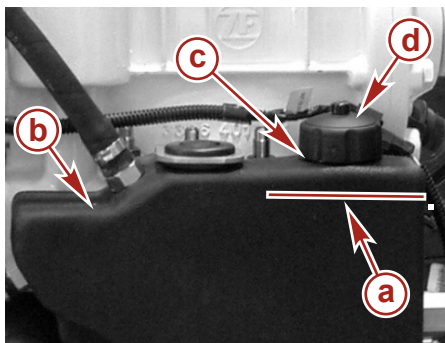
27857

- a** - Correct fluid level
- b** - Reservoir
- c** - Bottom of filler neck
- d** - Cap

4. If the level is low, see **Filling**.

Filling

1. Using a clean, lint-free cloth, wipe the dirt and debris away from the cap and exterior of the steering actuator and trim fluid reservoir.
2. Remove the cap.
3. Fill the reservoir with the specified fluid until the fluid is 25 mm (1 in.) below the bottom of the filler neck of the reservoir. Do not overfill.
4. Install the cap.



27857

- a** - Correct fluid level
- b** - Reservoir
- c** - Bottom of filler neck
- d** - Cap

Description	Fluid Capacity	Fluid Type	Fluid Part Number
Steering actuator and trim system (approximate total capacity)	5-3/4 to 6 liters (6 to 6-1/3 quarts)	Synthetic Power Steering Fluid SAE 0W-30	92-858077K01

Changing

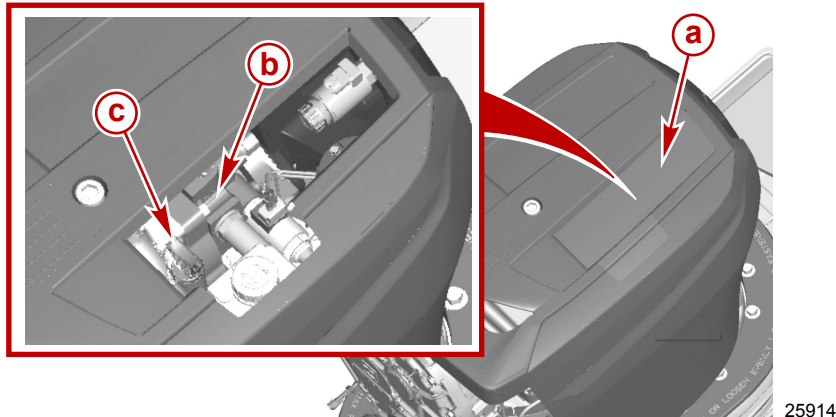
Contact your local Cummins MerCruiser Diesel Authorized Repair Facility.

Transmission Fluid

Checking

You can check the transmission fluid level through the access cover on the drive cover or with the drive cover removed.

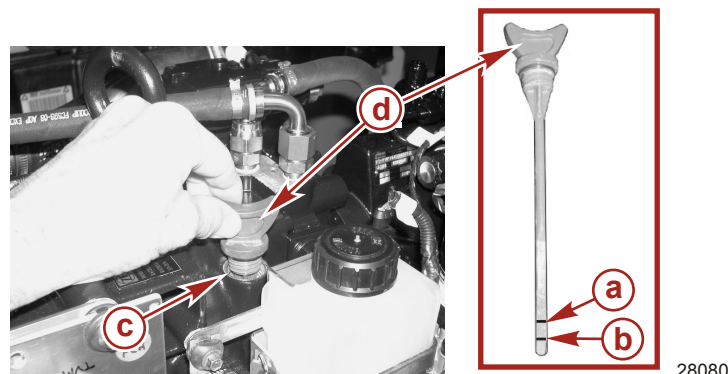
1. If the drive cover is removed, go to step 3.
2. If the drive cover is installed, remove the access cover from the drive cover; then, go to step 3.



- a - Access cover
- b - Transmission
- c - Transmission dipstick

3. Remove the dipstick. Wipe the dipstick with a clean, lint-free cloth.
4. Insert the dipstick, resting it on the top of the threaded hole.
5. Remove the dipstick and check the fluid level indicated. The fluid level should be between the maximum and minimum marks on the dipstick.

NOTE: Fluid from the transmission fluid cooler and hoses may drain into the transmission, causing a fluid level slightly above the maximum mark.



Checking—dipstick rested on top of threaded hole

- a - Maximum mark
- b - Minimum mark
- c - Top of threaded hole
- d - Dipstick

6. If the level is correct, install the dipstick.

7. If the fluid level is low, add the specified transmission fluid through the dipstick threaded hole to bring the level up to the maximum mark on the dipstick.

Description	Fluid Type	Fluid Part Number
Transmission and drop box	Synthetic Power Steering Fluid SAE 0W-30	92-858077K01

NOTE: If the transmission fluid level is extremely low, see your local Cummins MerCruiser Diesel Authorized Repair Facility.

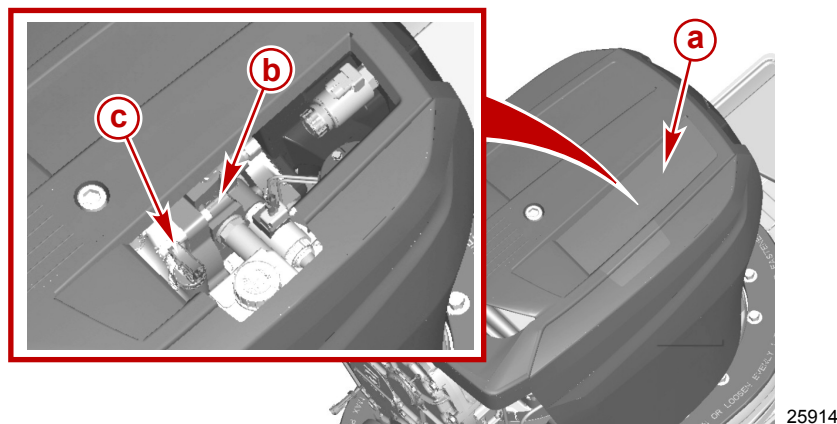
IMPORTANT: For a more accurate measurement, operate the engine at 1500 RPM for three minutes immediately before checking the fluid level.

8. Start the engine and operate at 1500 RPM for three minutes to fill all the hydraulic circuits.
9. Stop the engine and quickly check the fluid level.
10. If the fluid level is low, add the specified transmission fluid to bring the level up to the maximum mark on the dipstick.
11. Install the dipstick.
12. Install the access cover onto the drive cover if it was removed.
13. Install the drive cover if it was removed. See **Installing the Drive Cover**.

Filling

You can fill the transmission with fluid through the access cover on the drive cover or with the drive cover removed.

1. Remove the drive cover to fill the transmission with the drive cover removed. See **Removing the Drive Cover**, then go to step 3.
2. Remove the access cover from the drive cover, if filling with the drive cover installed. Go to step 3.
3. Remove the dipstick. Wipe the dipstick with a clean, lint-free cloth. Check the fluid level as outlined in **Checking**.



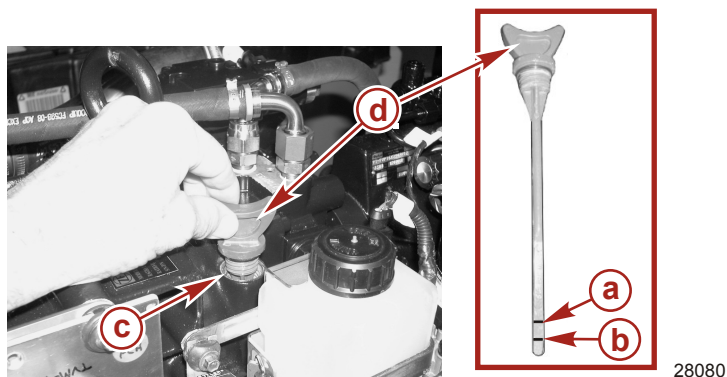
- a - Access cover
- b - Transmission
- c - Transmission dipstick

4. Add the specified transmission fluid through the dipstick threaded hole to bring the level up to the maximum mark on the dipstick.

Description	Fluid Capacity	Fluid Type	Fluid Part Number
Transmission and drop box	5-¼ liters (5-½ quarts)	Synthetic Power Steering Fluid SAE 0W-30	92-858077K01
Transmission only	4 liters (4-¼ quarts)		

IMPORTANT: For a more accurate measurement, operate the engine at 1500 RPM for three minutes immediately before checking the fluid level.

- Start the engine and operate at 1500 RPM for three minutes to fill all the hydraulic circuits.
- Stop the engine. Quickly unscrew and remove the dipstick.
- Check the fluid level as outlined in **Checking**.



- a** - Maximum mark
- b** - Minimum mark
- c** - Top of threaded hole
- d** - Dipstick

- If the fluid level is low, add the specified transmission fluid to bring the level up to the maximum mark on the dipstick.
- Install the dipstick.
- Install the access cover onto the drive cover if it was removed.
- Install the drive cover if it was removed. See **Installing the Drive Cover**.

Changing

NOTICE

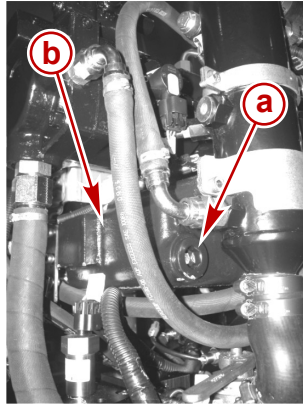
Discharge of oil, coolant, or other engine/drive fluids into the environment is restricted by law. Use caution not to spill oil, coolant, or other fluids into the environment when using or servicing your boat. Be aware of the local restrictions governing the disposal or recycling of waste, and contain and dispose of fluids as required.

⚠ WARNING

The rubber interface ring seal has an outside coating that protects the inner core. Tears, cuts, scrapes, or exposure to lubricants or sealing compounds can damage this coating and the inner core causing water to leak into the boat. Use caution when installing and working around the interface ring seal to prevent damage. Do not use any lubricants or sealing compounds during installation.

- Remove the drive cover. See **Removing the Drive Cover**.
- Lay down oil-absorbing wipes or material to catch excess transmission fluid.

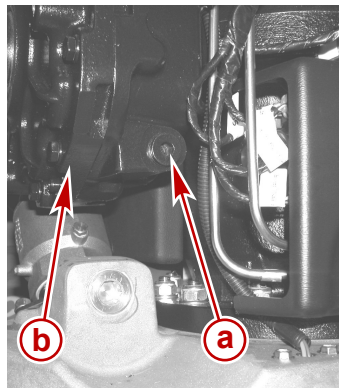
3. Remove the M30 × 1.5 drain plug and sealing washer from the aft, starboard end of the transmission and drain the transmission fluid into a suitable container.



28237

- a** - Drain plug and sealing washer
- b** - Transmission

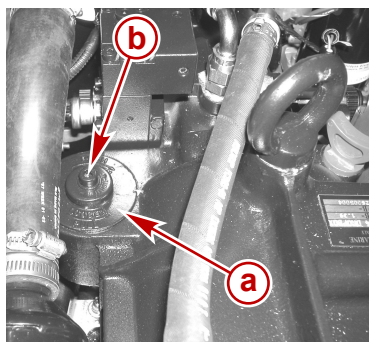
4. On models with a drop box, remove the M16 × 1.5 drain plug and sealing washer from the lower, port side of the drop box and drain the transmission fluid into a suitable container.



28236

- a** - Drain plug and sealing washer
- b** - Drop box

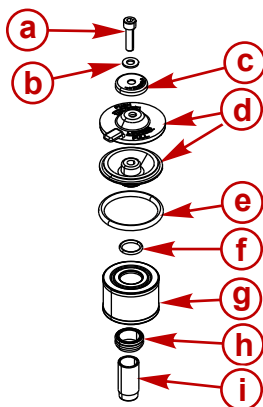
5. Dispose of the fluid properly.
6. Clean the exterior of the transmission around the fluid filter assembly.
7. Use a 6 mm Allen wrench and remove the fluid filter assembly screw.



28239

- a** - Fluid filter assembly
- b** - Assembly screw

8. Remove the filter cover assembly.
9. Remove and discard the filter element and the O-rings.



28242

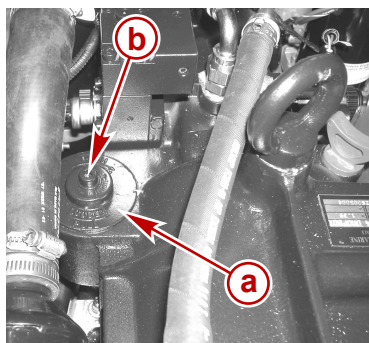
- | | |
|----------------------------------|---------------------------|
| a - Assembly screw | f - O-ring |
| b - Washer | g - Filter element |
| c - Cover | h - Seal |
| d - Filter cover assembly | i - Oil pipe |
| e - O-ring | |

10. Coat the new O-rings with transmission fluid.
11. Install the new O-rings and filter element.

NOTICE

Improper installation of the transmission fluid filter assembly may cause the fluid to foam or leak out, resulting in decreased efficiency and damage to the transmission. Properly seat the transmission fluid filter during installation.

12. Install the fluid filter assembly in the transmission cavity by turning the assembly clockwise during installation.
13. Using a 6 mm Allen wrench, tighten the filter assembly screw to specification.



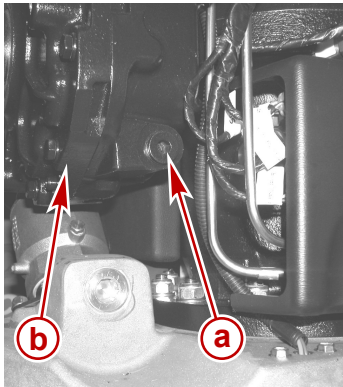
28239

- | |
|----------------------------------|
| a - Assembly screw |
| b - Fluid filter assembly |

Description	Nm	lb. in.	lb. ft.
Filter assembly screw	5-8	48-72	–

IMPORTANT: Use new sealing washers to avoid leaks.

14. On models with a drop box, install the drop box drain plug with a new sealing washer. Tighten the drop box drain plug to specification.

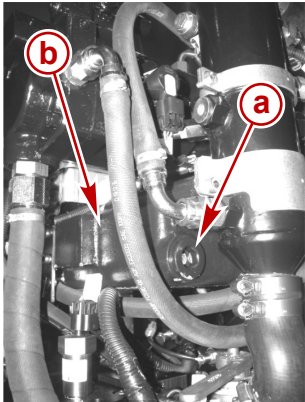


28236

- a - Drain plug and sealing washer
b - Drop box

Description	Nm	lb. in.	lb. ft.
Drop box drain plug	22	194	–

15. Install the transmission drain plug with a new sealing washer. Tighten the transmission drain plug to specification.



28237

- a - Drain plug and sealing washer
b - Transmission

Description	Nm	lb. in.	lb. ft.
Transmission drain plug	90	–	66

NOTE: The drop box fills with fluid when the transmission is filled.

16. Fill the transmission to the proper level with the specified fluid. See **Filling**.
17. Install the drive cover. See **Installing the Drive Cover**.

Seawater Strainer

Refer to the appropriate Cummins **Operation and Maintenance Manual Marine Engine** for seawater strainer maintenance instructions.

Battery

All lead acid batteries discharge when not in use. Recharge every 30 to 45 days, or when specific gravity drops below battery manufacturer's specifications.

Refer to specific instructions and warnings accompanying your battery. If this information is not available, observe the following:

WARNING

An operating or charging battery produces gas that can ignite and explode, spraying out sulfuric acid, which can cause severe burns. Ventilate the area around the battery and wear protective equipment when handling or servicing batteries.

WARNING

Recharging a weak battery in the boat, or using jumper cables and a booster battery to start the engine, can cause serious injury or product damage from fire or explosion. Remove the battery from the boat and recharge in a ventilated area away from sparks or flames.

Gauges

Checking Gauges

1. Check that all gauges are securely mounted.
2. Check that any viewing systems such as VesselView, if equipped, are securely mounted.
3. Check for loose, damaged, or corroded wiring and connectors.
4. Contact your Cummins MerCruiser Diesel Authorized Repair Facility for correction or repair if necessary.

Cleaning Gauges

Clean gauge by washing with fresh water to remove sand and salt deposits. Wipe off with a soft cloth moistened with water. The gauge may be scored or damaged if wiped with abrasive material (sand, saline or detergent compounds, etc.) or washed with solvents such as trichlorethylene, turpentine etc.

Electrical System

1. Check for loose, damaged, or corroded fasteners.
2. Check for loose, damaged, or corroded wiring and connectors.

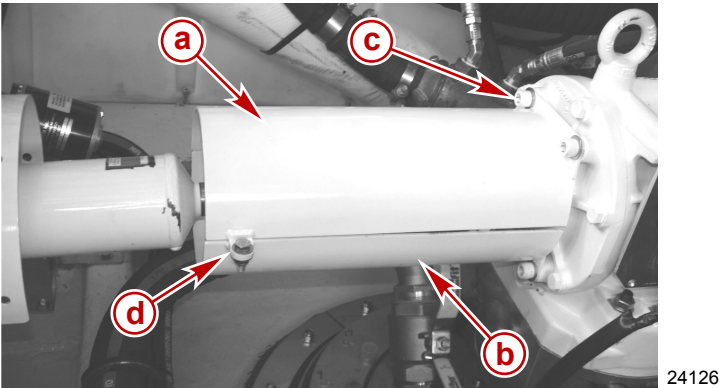
Cooling System and Exhaust System

1. Inspect the cooling and exhaust systems for damage or leaks.
2. Check the cooling and exhaust system hose clamps for tightness.

Lubrication

Driveshaft Slip-Joint

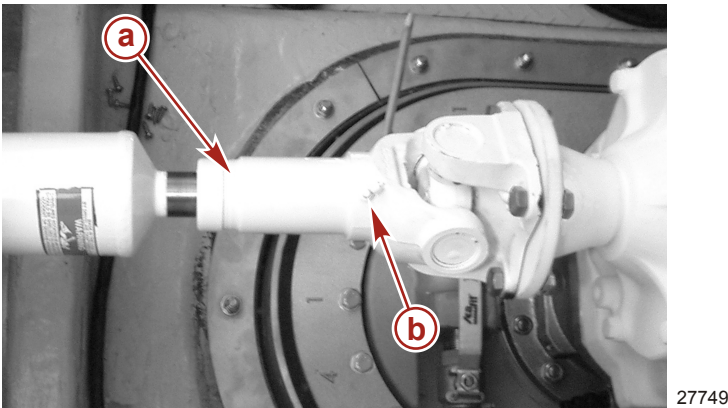
1. Remove the top and bottom driveshaft shields on the transmission end as shown.



Top shield and bottom shield at transmission end

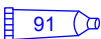
- a - Top shield
- b - Bottom shield
- c - Socket-head driveshaft shield-to-transmission retaining hardware
- d - Driveshaft shield upper-to-lower retaining hardware

2. Lubricate the driveshaft slip-joint through the grease fitting by applying approximately 3-6 pumps of specified grease from a typical hand-operated grease gun.

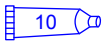


- a - Driveshaft slip-joint
- b - Grease fitting

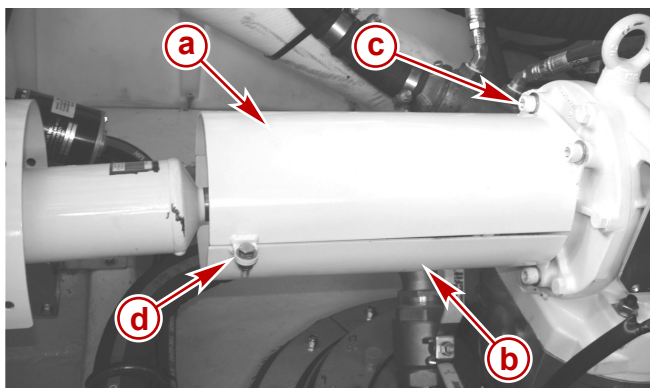
Tube Ref No.	Description	Where Used	Part No.
 42	U-joint and Gimbal Bearing Grease	Driveshaft slip-joint	92-802870A1

Tube Ref No.	Description	Where Used	Part No.
 91	Engine Coupler Spline Grease	Driveshaft slip-joint	92-802869A1

3. Apply adhesive to the threads of the screws and bolts of the shield on the transmission end.

Tube Ref No.	Description	Where Used	Part No.
 10	Loctite 277	Driveshaft shield retaining screw and nut	Obtain Locally

- Install the top and bottom driveshaft shields on the transmission end as shown. Tighten the driveshaft shield retaining screws and nuts on the transmission end to specifications.



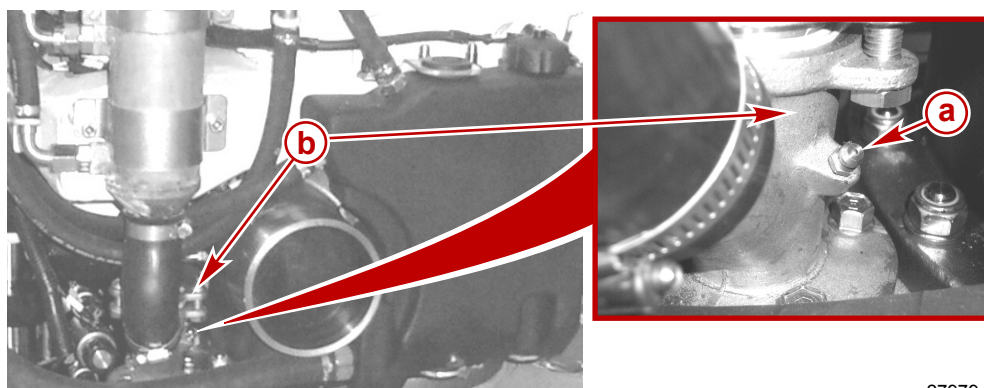
Top shield and bottom shield at transmission end

- a** - Top shield
- b** - Bottom shield
- c** - Socket-head driveshaft shield-to-transmission retaining screw (M10 × 1.25 25 mm [1 in.] long) and washer
- d** - Driveshaft shield upper-to-lower retaining screw (M8 × 1.25 12 mm [1/2 in.] long), nut, and washer

Description	Nm	lb. in.	lb. ft.
Driveshaft shield retaining screw and nut—transmission end	36	–	27
Driveshaft shield upper-to-lower retaining screw and nut	17	–	23

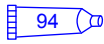
Seacock—Seawater Return (Overboard)

- Lubricate the seacock through the grease fitting by applying approximately 3-6 pumps of specified grease from a typical hand-operated grease gun.



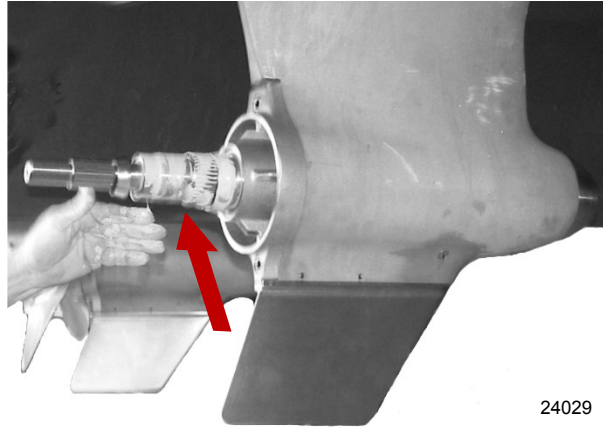
Typical drive (with cover removed for visual clarity)

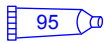
- a** - Grease fitting
- b** - Seacock (seawater return [overboard])

Tube Ref No.	Description	Where Used	Part No.
 94	Anti-Corrosion Grease	Seacock	92-802867Q 1

Propeller Shaft

1. Remove the propellers. Refer to **Propellers**.
2. Apply a liberal coat of one of the following lubricants to the propeller shafts.



Tube Ref No.	Description	Where Used	Part No.
 94	Anti-Corrosion Grease	Propeller shafts	92-802867Q 1
 34	Special Lubricant 101	Propeller shaft	92-802865Q02
 95	2-4-C Marine Lubricant with Teflon	Propeller shaft	92-802859A1

3. Install the propellers. Refer to **Propellers**.

Corrosion Protection

NOTICE

Washing the MerCathode assembly can damage components and lead to rapid corrosion. Do not use any cleaning equipment such as brushes or high-pressure washers to clean the MerCathode assembly.

Whenever two or more dissimilar metals (like those found on the drive) are submerged in a conductive solution, such as saltwater, polluted water, or water with a high mineral content, a chemical reaction takes place causing electrical current to flow between metals. The electrical current flow causes the metal that is most chemically active, or anodic, to erode. This is known as galvanic corrosion and, if not controlled, it will in time cause the need for replacement of power package components exposed to water. Refer to the **Marine Corrosion Protection Guide** (90-88181301).

Anodes and MerCathode System

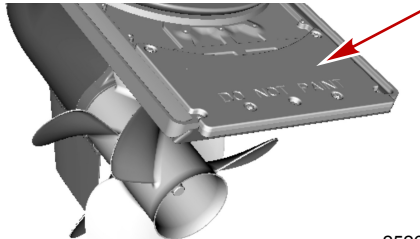
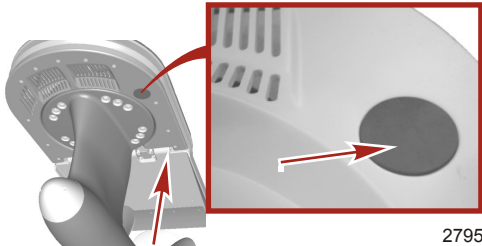
Anodes help protect against galvanic corrosion by sacrificing their metal to be slowly eroded instead of the metal components on the drive or vessel.

Corrosion protection for the drive is provided by sacrificial anodes installed on the trim tabs. Other sacrificial anodes may be mounted on the vessel to ensure against corrosion of vessel components.

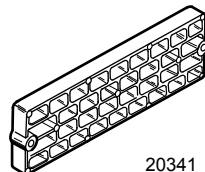
IMPORTANT: Replace the sacrificial anodes if they are eroded 50 percent or more.

The MerCathode system uses an electrode controller and anode assembly to protect against galvanic corrosion.

The system should be tested to ensure adequate output. The test should be performed where the boat is moored, using the Quicksilver Reference Electrode and Test Meter. For testing, contact a Cummins MerCruiser Diesel Authorized Repair Facility or refer to the appropriate **Cummins MerCruiser Drive Service Manual**.

Anodes and MerCathode System Locations		
Description	Location	Figure
Trim tab anode plate	Mounted on the trim tab	 25261
MerCathode System	The MerCathode reference electrode and anode are mounted to the composite cover on the underside of the drive. The MerCathode controller is mounted on the transmission. The controller harness connects the components.	 27955

Other sacrificial anodes, if equipped, may be mounted on the vessel to protect against galvanic corrosion. Refer to the operation and maintenance manual provided by the boat manufacturer for additional information about vessel mounted anodes.

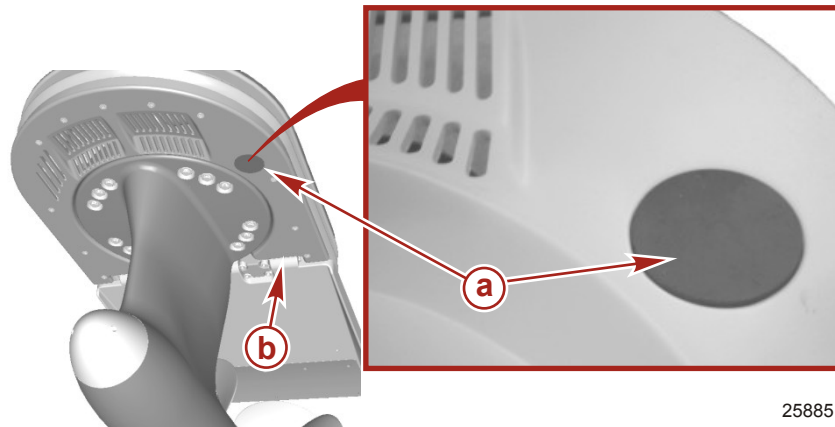
Other Anodes and Locations		
Description	Location	Figure
Anode kit (if equipped)	Mounted to the boat transom.	 20341

Reference Electrode Wire of the MerCathode System

NOTICE

Washing the MerCathode assembly can damage components and lead to rapid corrosion. Do not use any cleaning equipment such as brushes or high-pressure washers to clean the MerCathode assembly.

Do not pressure-wash the reference electrode of the MerCathode assembly. Doing so damages the coating on the reference electrode wire and decrease the corrosion protection.

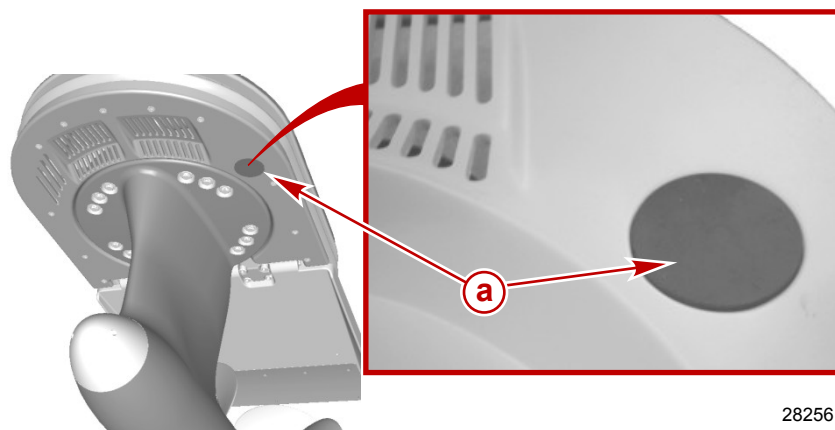


a - Anode

b - Reference electrode (not visible in this view)

MerCathode Anode CHECKING

1. Inspect the MerCathode anode and replace the anode if damaged.



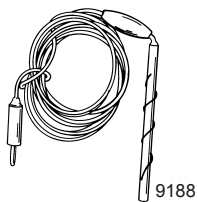
a - Anode

REPLACING

Contact your Cummins MerCruiser Diesel Authorized Repair Facility.

MerCathode System Testing

If the boat is equipped with a Quicksilver MerCathode system, test the system to ensure that it is providing adequate output to protect the underwater metal parts on the boat. The test should be made where the boat is moored, using a Quicksilver Reference Electrode and Test Meter.

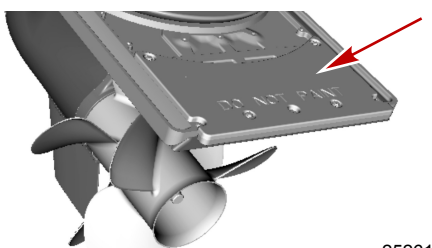
Reference Electrode	91-76675T 1
 9188	Senses the electrical current in the water when testing the MerCathode system. Use to check hull potential.

Contact a Cummins MerCruiser Diesel Authorized Repair Facility for testing or refer to the appropriate **Cummins MerCruiser Diesel Drive Service Manual** for testing procedures.

Trim Tab Anodes

CHECKING

1. Inspect the trim tab anodes.
2. Replace the anodes if they are eroded 50 percent or more.



25261

Trim tab anode

REPLACING

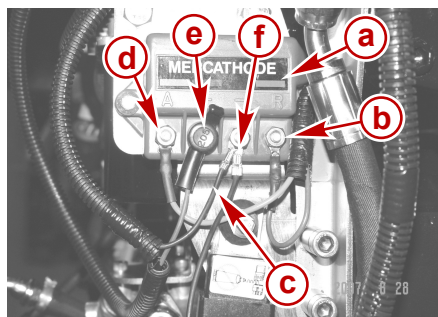
Contact your Cummins MerCruiser Diesel Authorized Repair Facility.

Continuity Circuits

NOTE: Refer to the operation and maintenance manual provided by the boat manufacturer for maintenance information about vessel mounted anodes and related continuity circuits.

The drive system is equipped with ground circuit wires to ensure good electrical continuity between the drive components. Good continuity to a ground (–) is essential for the anode and MerCathode system to function most effectively.

1. Remove the drive cover. Refer to **Removing the Drive Cover** in this section.
2. Inspect the MerCathode controller and wires for loose connections, broken connectors, or frayed wiring.



29037

a - MerCathode controller

b - Reference electrode wire

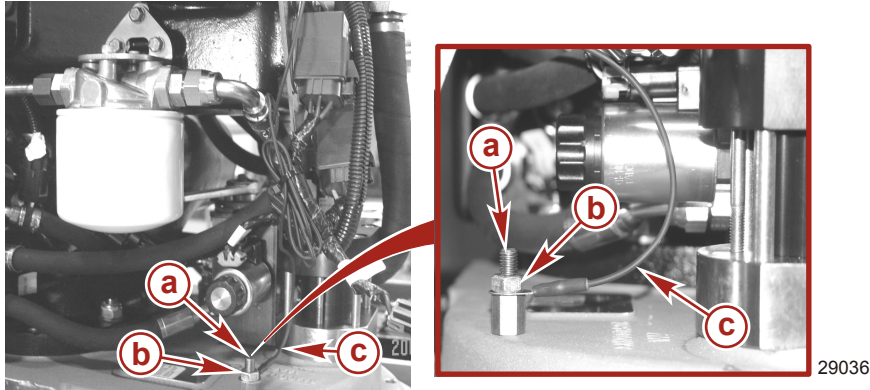
c - Battery negative (–) terminal wire

d - Anode wire

e - Battery positive (+) terminal wire

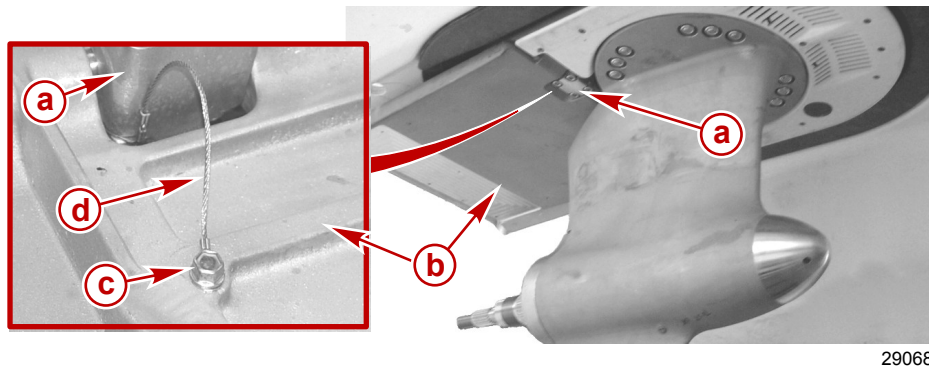
f - Black/green continuity wire (–) to bonding stud

3. Inspect the bonding stud, nut, and continuity wire (–) on the center section for corrosion, loose connections, broken connectors, or frayed wiring.



- a - Bonding stud
- b - Nut
- c - Black/green continuity wire

4. At the specified interval, with the boat out of the water, lower the trim tabs and inspect the continuity wire (–) located between the trim tab and the hinge block.



- a - Hinge block
- b - Trim tab
- c - Screw
- d - Continuity wire

Inhibiting Corrosion

In addition to the corrosion protection devices, follow these steps to inhibit corrosion:

1. Paint your power package. See **Painting the Power Package**.
2. Spray power package components on the inside of the boat annually with Corrosion Guard to protect the finish from dulling and corrosion.
3. Keep all lubrication points well lubricated.

Painting the Boat

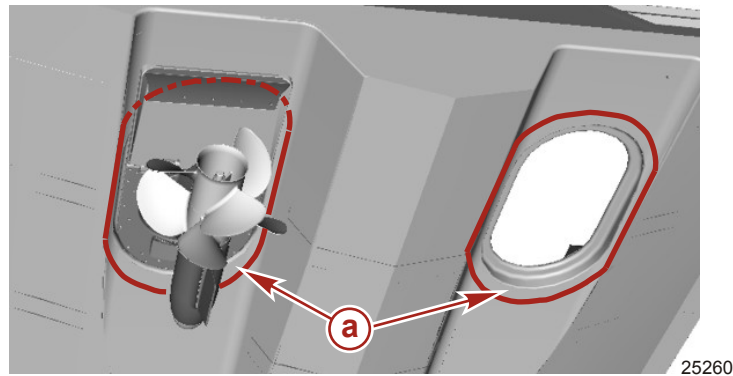
IMPORTANT: The limited warranty does not cover corrosion damage as a result of improper paint application.

IMPORTANT: Paint renders anodes and the MerCathode system ineffective as inhibitors of galvanic corrosion.

When painting the boat hull with anti-fouling paint, observe the following:

- Use high-quality, anti-fouling paint designed for marine use.

- Avoid using anti-fouling paint that contains copper material, which could conduct electrical current.
- If using copper-based or tin-based paints is necessary, ensure that you comply with all local and federal laws prohibiting their use.
- Do not paint drain holes or items as specified by the boat manufacturer.
- Do not paint any anodes or the MerCathode system components.
- Avoid any electrical interconnection between the paint and drive, anodic blocks, trim tab anodes, or MerCathode system by allowing a minimum of 40 mm (1-1/2 in.) unpainted area on the hull of the boat around these items and as shown in the following figure.



Unpainted area

- a** - Minimum unpainted 40 mm (1-1/2 in.) area around the interface ring seal (grommet) on models with a molded-in tunnel opening or around the bolt-on interface ring assembly (if equipped)

Propellers

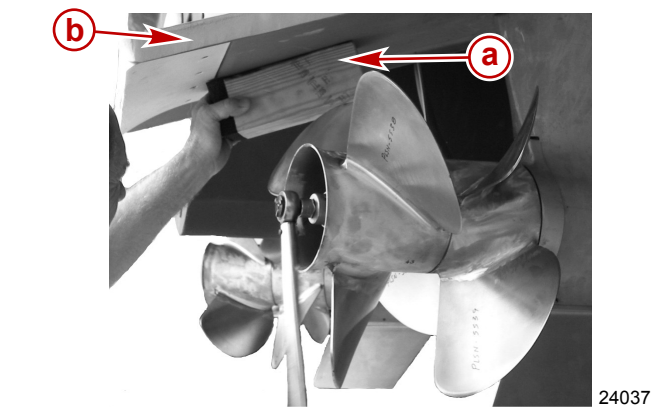
Propeller Removal

⚠ WARNING

Rotating propellers can cause serious injury or death. Never operate the boat out of the water with a propeller installed. Before installing or removing a propeller, remove the key from the key switch, place the drive in neutral, and engage the E-stop switch to prevent the engine from starting.

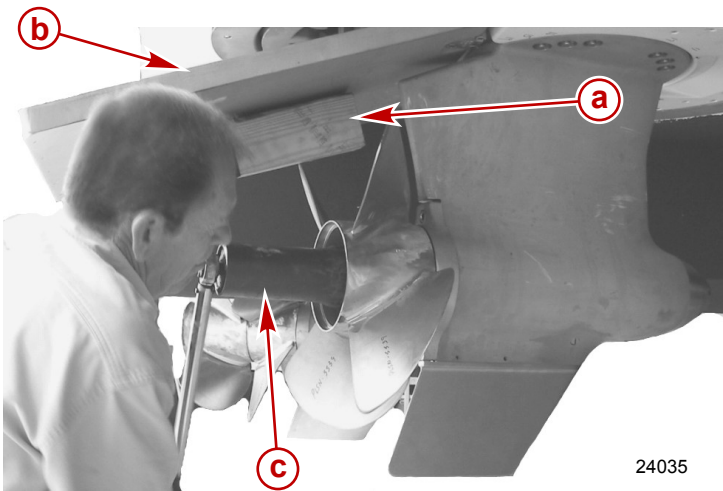
1. Place a block of wood between the rear propeller blade and the trim tab.

2. Turn the rear propeller nut counter-clockwise to remove the nut.



a - Block of wood
b - Trim tab

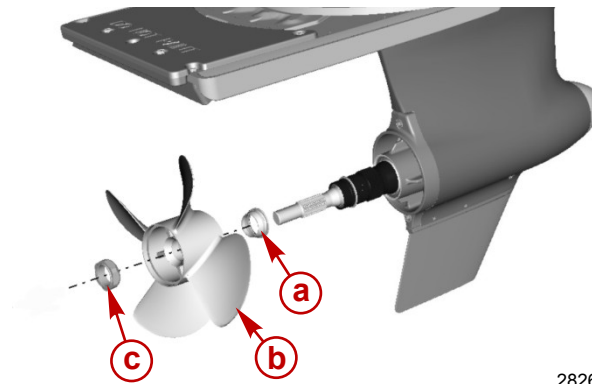
3. Slide the propeller and thrust hub off of the propeller shaft.
4. Using the propeller nut tool, turn the front propeller nut counter-clockwise and remove the nut.



a - Block of wood
b - Trim tab
c - Propeller nut tool

Propeller Nut Tool	91-805457T 1
 10677	Aids in the removal and installation of the front propeller nut.

5. Slide the front propeller and the front thrust hub off the propeller shaft.



28265

- a - Front thrust hub
b - Front propeller
c - Front propeller nut

Propeller Repair

Some damaged propellers can be repaired. Contact your Cummins MerCruiser Diesel Authorized Repair Facility.

Propeller Installation

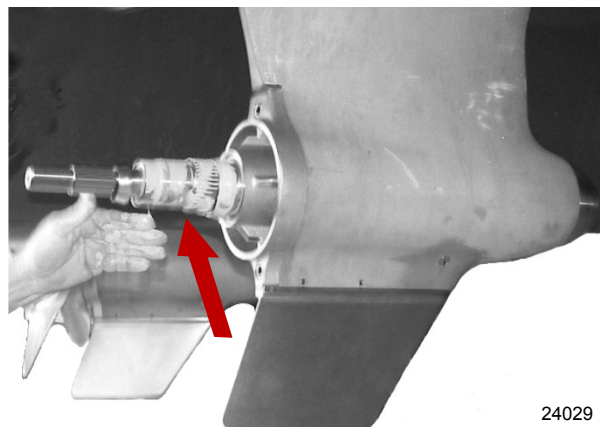
⚠ WARNING

Rotating propellers can cause serious injury or death. Never operate the boat out of the water with a propeller installed. Before installing or removing a propeller, place the drive unit in neutral and engage the lanyard stop switch to prevent the engine from starting.

1. Liberally coat the propeller shaft spline with one of the following Quicksilver lubricants.

NOTE: Anti-corrosion grease is for saltwater applications only.

Tube Ref No.	Description	Where Used	Part No.
34	Special Lubricant 101	Propeller shaft splines	92-802865Q02
95	2-4-C Marine Lubricant with Teflon	Propeller shaft splines	92-802859A1
94	Anti-Corrosion Grease	Propeller shaft splines	92-802867Q 1

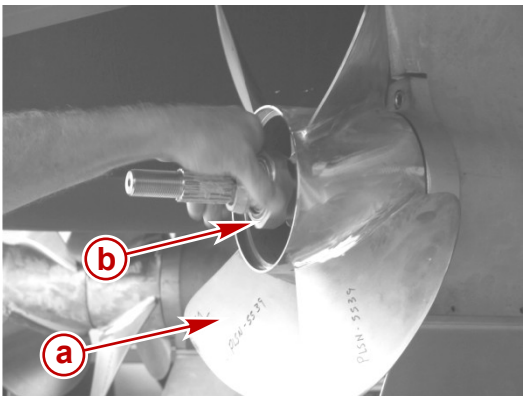


24029

Lubricating the propeller shaft splines

IMPORTANT: Check that both the front and aft propeller part numbers match for port and starboard drives.

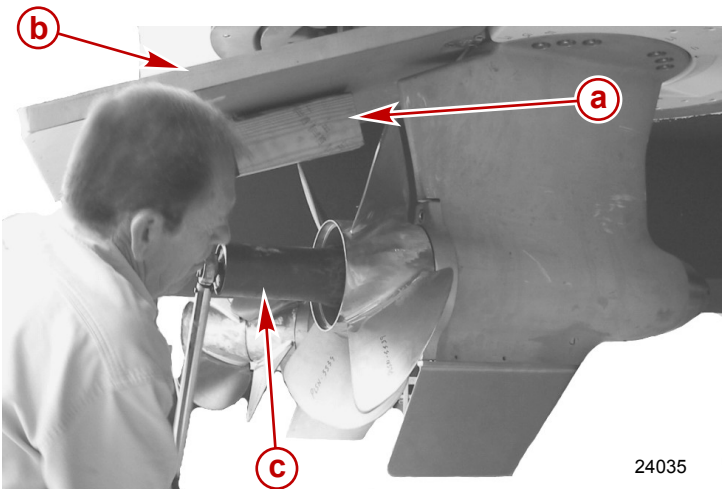
- 2. Slide the front thrust hub onto the propeller shaft with the tapered side toward the propeller hub.
- 3. Align the splines and place the front propeller on the propeller shaft. The propeller must fit freely on the propeller shaft splines.
- 4. Install the front propeller nut.



24031

a - Front propeller
b - Nut

- 5. Place a block of wood between the trim tab and the propeller.
- 6. Tighten the front propeller nut to specification using the propeller nut tool.



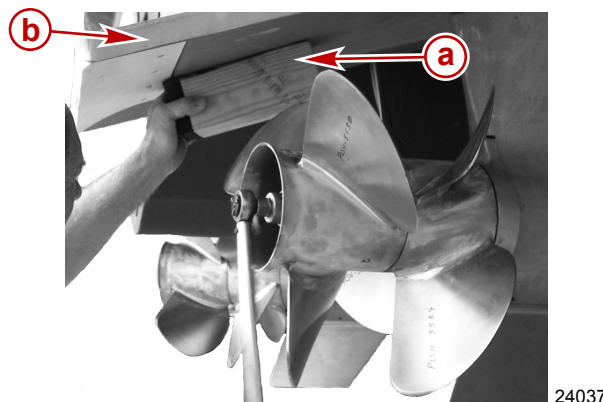
24035

a - Block of wood
b - Trim tab
c - Propeller nut tool

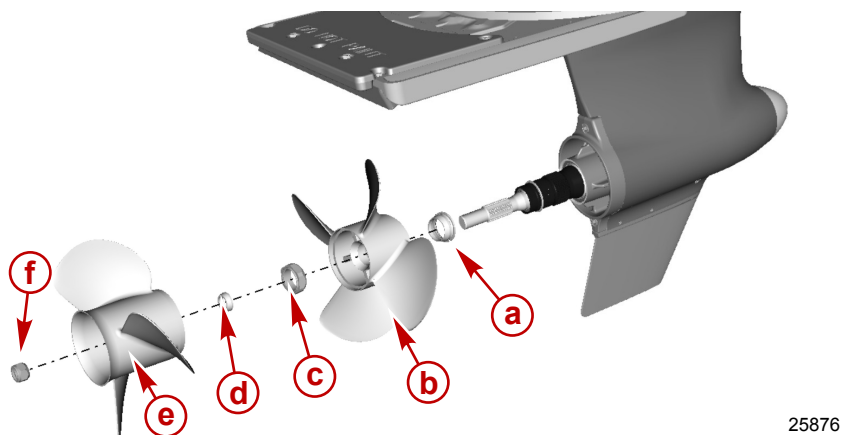
Propeller Nut Tool	91-805457T 1
 10677	Aids in the removal and installation of the front propeller nut.

Description	Nm	lb. in.	lb. ft.
Front propeller nut	136	–	100

7. Check the propeller for rotation. The propeller must not contact the lower drive housing.
8. Slide the rear thrust hub onto the propeller shaft with the tapered side toward the propeller hub.
9. Align the splines and place the rear propeller on the propeller shaft. The propeller must fit freely on the propeller shaft splines.
10. Install the rear propeller nut.
11. Place a block of wood between the trim tab and the propeller.
12. Tighten the rear propeller nut to specification.



- a** - Block of wood
b - Trim tab



Zeus drive propeller assembly

- a** - Front thrust hub
b - Front propeller
c - Front propeller nut
d - Rear thrust hub
e - Rear propeller
f - Rear propeller nut

Description	Nm	lb. in.	lb. ft.
Rear propeller nut	81	–	60

Notes:

Section 6 - Storage

Table of Contents

Cold Weather (Freezing Temperature) Storage and Seasonal Storage.....	102	Battery Storage.....	103
Storage Descriptions.....	102	Recommissioning.....	103
Preparing the Power Package for Storage.....	102	Engine.....	103
Drive Storage.....	102	Drive.....	103
Engine Storage.....	103	Power Package.....	103

Cold Weather (Freezing Temperature) Storage and Seasonal Storage

Storage Descriptions

IMPORTANT: We strongly recommend that this service be performed by a Cummins MerCruiser Diesel Authorized Repair Facility. Damage caused by freezing is not covered by the Cummins MerCruiser Diesel Limited Warranty.

NOTICE

Water trapped in the seawater section of the cooling system can cause corrosion or freeze damage. Drain the seawater section of the cooling system immediately after operation or before any length of storage in cold weather. If the boat is in the water, keep the seacock closed until restarting the engine to prevent water from flowing back into the cooling system. If the boat is not fitted with a seacock, leave the water inlet hose disconnected and plugged.

NOTE: As a precaution, attach a tag to the key switch or steering wheel of the boat to remind the operator to open the seacock or unplug and reconnect the water inlet hose before starting the engine.

The power package must be protected from freeze damage, corrosion damage, or both types of damage during storage. Storage is any length of time the product is not operated. Based on the length of storage certain precautions and procedures must be observed to protect the power package.

Freeze damage can happen when water trapped in the seawater cooling system freezes. For example, after operating the boat, exposure to freezing temperatures for even a brief period of time could result in freeze damage.

Corrosion damage is the result of saltwater, polluted water, or water with a high mineral content trapped in the seawater cooling system. Saltwater should not stay in an engine's cooling system for even a brief storage time; drain and flush the seawater cooling system after each outing.

Freezing-weather (freezing temperature) operation refers to operating the boat whenever freezing temperatures are possible. Likewise, freezing-weather storage refers to whenever the boat is not being operated and freezing temperatures are possible. In such cases, the seawater section of the cooling system must be completely drained immediately after operation.

Seasonal storage refers to when the boat is not being operated for one month or more. The duration varies according to the geographic location. Seasonal storage precautions and procedures include all the steps for freezing-weather storage and some additional steps that must be taken when storage will last longer than the short time of freezing-weather storage.

Preparing the Power Package for Storage

Drive Storage

IMPORTANT: Cummins MerCruiser Diesel strongly recommends that this service is preformed by an Authorized Cummins MerCruiser Diesel repair facility. Damage caused by freezing is not covered by the Cummins MerCruiser Diesel Limited Warranty.

1. Close the seacocks.
2. Perform all maintenance specified for completion under the interval of Every 500 Hours or Once a Year (Whichever Occurs First) in **Section 5—Maintenance Schedules**.

Engine Storage

Read all precautions and perform all appropriate storage procedures found in the **Marine Recreational High Output Propulsion Units QSB and QSC Operation and Maintenance Manual** available from the engine manufacturer.

Battery Storage

Whenever the battery will be stored for an extended period of time, be sure the cells are full of water and the battery is fully charged and in good operating condition. It should be clean and free of leaks. Follow the battery manufacturer's instructions for storage.

Recommissioning

Engine

NOTE: Discharge of propylene glycol into the environment may be restricted by law. Contain and dispose of propylene glycol in accordance with federal, state, and local laws and guidelines.

1. On engines that were prepared for cold weather (freezing temperature) or seasonal storage, drain the propylene glycol into a suitable container. Dispose of the propylene glycol in accordance with federal, state, and local laws and guidelines.
2. Refer to the **Marine Recreational High Output Propulsion Units QSB or QSC Operation and Maintenance Manual** available from the engine manufacturer and accomplish recommissioning procedures as specified by the manufacturer.

Drive

1. Perform all maintenance specified for completion under the interval of Every 500 Hours or Once a Year (Whichever Occurs First) in **Section 5—Maintenance** except items that were performed at the time of drive layup.
2. Check all fluid levels before first use.

Power Package

⚠ CAUTION

Disconnecting or connecting the battery cables in the incorrect order can cause injury from electrical shock or can damage the electrical system. Always disconnect the negative (-) battery cable first and connect it last.

1. Install a fully charged battery. Clean the battery cable clamps and terminals. Reconnect the cables (see the CAUTION listed above). Secure each cable clamp when connecting. Coat terminals with a battery terminal anti-corrosion spray to help retard corrosion.

NOTICE

Failure to provide sufficient cooling water will damage the water pump and cause the engine to overheat. Provide a sufficient supply of water at the water inlets during operation.

2. Open the seacocks.
3. If the boat is not in the water, supply cooling water to the water inlet openings.
4. Start the engine and closely observe the instrumentation and system view panel. Ensure that all systems are functioning correctly.

5. Refer to the **Marine Recreational High Output Propulsion Units QSB or QSC Operation and Maintenance Manual**, available from the engine manufacturer and carefully inspect the engine for fuel, oil, fluid, water, and exhaust leaks.
6. Carefully inspect the drive for lubricant, fluid, water, and exhaust leaks.
7. Check the steering system, the ERC shift control and throttle control, and the joystick for proper operation.
8. Check all lubricant and fluid levels after first use.

Section 7 - Troubleshooting

Table of Contents

Diagnosing Electronically Controlled Fuel System Problems.....	106	Joystick.....	107
Electrical Connections.....	106	Electronic Remote Controls.....	107
Troubleshooting Charts.....	106	Steering System.....	108
Troubleshooting Engine Related Problems		Trim Tabs.....	109
.....	106	Boat Response Changes.....	109
Check VesselView First.....	106	Battery Will Not Charge.....	109
Poor Performance.....	107	Gauges and Instrumentation.....	110

Diagnosing Electronically Controlled Fuel System Problems

Your Cummins MerCruiser Diesel Authorized Repair Facility has the proper service tools for diagnosing problems on electronically controlled fuel systems. The Engine Control Module (ECM) on these engines has the ability to detect some problems with the system when they occur, and store a trouble code in the ECM's memory. This code can then be read later by a service technician using a special diagnostic tool.

Electrical Connections

NOTE: Refer to **Section 6** *Electrical System Architecture diagrams* and for additional electrical information.

IMPORTANT: To avoid damage to the electrical system, refer to the following precautions when working on or around the electrical harness or when adding other electrical accessories.

- Do not tap accessories into the engine harness.
- Do not puncture wires for testing (probing).
- Do not reverse the battery leads.
- Do not splice wires into the harness.
- Do not route harness near sharp edges, hot surfaces, or moving parts.
- Fasten cables away from and sharp edges, fasteners, or objects that could wear into the harness or pinch the harness.
- Avoid sharp bends in a data harness. Minimum bend radius should be 7.6 cm (3 in.) for installation.
- Fasten harnesses to the boat at least every 45.7cm (18 in.), using appropriate fasteners.
- Do not attempt diagnostics without the proper, approved service tools.
- Disconnect both the negative (–) and positive (+) battery cables from the battery before electric arc welding on the vessel. Attach the welder ground cable no more than 0.61 meters [2 feet] from the part being welded. Do not connect the ground cable of the welder to any ECM cooling plate or ECM. Welding on the engine, drive, or engine or drive mounted components is not recommended or damage to the engine or drive or related components can result.

Troubleshooting Charts

Troubleshooting Engine Related Problems

Troubleshooting engine related problems may require information not found in these troubleshooting charts. Additional troubleshooting information can be found in the owners manual for the engine. Refer to the appropriate **Marine Recreational High Output Propulsion Units QSB or QSC Operation and Maintenance Manual** provided with the engine.

Check VesselView First

Your VesselView display is the primary information source for the various functions of your boat. Consult the VesselView display if you suspect something is wrong. VesselView displays faults and other information that can be helpful in determining the current status of various systems that could be causing your concern and the solution to the problem.

Poor Performance

Symptom	Remedy
Throttle not operating properly.	Check that the Cruise Control is disengaged. Turn off Troll or Dock functions on DTS control pad. Refer to Special DTS Functionality .
Damaged or improper propeller.	Replace the propeller. See an Authorized Cummins MerCruiser Diesel Repair Facility.
Excessive bilge water.	Drain and check for the cause of entry.
Boat overloaded or load improperly distributed.	Reduce the load or redistribute the load more evenly.
Boat bottom fouled or damaged.	Clean or repair as necessary.
Tabs locked in the down position.	Unlock the automatic tab override switch.
Poor quality of fuel.	Use a cetane booster as recommended by your Authorized Cummins MerCruiser Diesel Repair Facility.
Water in the fuel.	Run out fuel and fill with fresh fuel. The fuel filter may need to be drained or changed several times during this process.
Engine or electronic fuel system fault.	Have the engine or electronic fuel system checked by an Authorized Cummins MerCruiser Diesel Repair Facility.
Guardian fault code set.	Check VesselView for Guardian fault codes that cause engine power reduction. If found, have the system checked by your Authorized Cummins MerCruiser Diesel Repair Facility.

Joystick

Symptom	Remedy
Joystick does not control boat.	Both remote controls are not in neutral. Put remote controls in neutral.
	One or both engines are not running. Start engine or engines.
Response to joystick inputs are erratic, or joystick operates independent of input.	Ensure there are no radios or other sources of electronic or magnetic interference near the joystick.
Joystick does not function properly and a fault code is set.	Check VesselView for Guardian fault codes that cause engine power reduction. If found, have the system checked by your Authorized Cummins MerCruiser Diesel Repair Facility.
Joystick does not work—No fault code set, cruise control engaged.	Disengage cruise control

Electronic Remote Controls

Symptom	Remedy
ERC (electronic remote control) lever is too hard or too easy to get out of neutral detent.	Adjust detent tension. See Section 2, Dual Handle Electronic Remote Control with DTS Trackpad Features and Operation .
ERC lever moves too hard or too easy through its range of motion.	Adjust handle tension screw. See Section 2, Dual Handle Electronic Remote Control with DTS Trackpad Features and Operation .

Symptom	Remedy
ERC lever increases engine RPM, but does not engage gears and boat does not move.	Key off and key on.
	Check "Throttle Only" button on DTS track pad. Put ERC levers in neutral and push the button to disengage, if the light is on.
	Check transmission fluid level and fill if necessary. See Section 5, Maintenance .
	Engage gears manually. See Section 3, Gear Engagement—Emergency Procedure .
	Contact your Authorized Cummins MerCruiser Repair Facility.
ERC lever controls engine and drive, but does not reach wide open throttle.	If engine only reaches 50% of WOT, check "DOCKING" button on DTS track pad. Put handles in neutral and push button to disengage, if light is on.
	Check VesselView to see if cruise control enabled. Disable cruise control.
	Check propeller for damage. Consult your Check VesselView for Guardian fault codes that cause engine power reduction. If found, have the vessel checked by your Authorized Cummins MerCruiser Diesel Repair Facility to discuss if propellers need to be changed.
	Unlock the Automatic Tab Override switch or raise tabs.
ERC lever controls engine and drive, but does not respond in a linear manner.	Check "TROLL" button on DTS track pad. Put handles in Neutral and push "TROLL" button to disengage, if light is on.
	Check if dock mode or cruise control are on. Turn off or disengage, if on.
One ERC lever is moved, but both engines respond.	Check "1 LEVER" button on DTS track pad. Put handles in neutral and push "1 LEVER" button to disengage, if light is on.
ERC control, joystick, and steering wheel do not function.	Restore helm control. Press "HELM" on DTS track pad. (Multiple helm boats only.)

Steering System

Symptom	Remedy
Steering wheel operates without resistance, but steers boat.	Starboard key switch tuned off. Turn on key.
	Check and start starboard engine.
	Starboard harness circuit breaker tripped. Reset circuit breaker.
Steering wheel does not steer the boat.	Change to joystick for directional control.
	Check steering actuator fluid level and fill if necessary. See Section 5, Maintenance .
	Contact your Authorized Cummins MerCruiser Diesel Repair Facility.
Steering works, but boat is not as responsive.	Key off and key on.
	Check and start port engine.
	Check trim tab function.
	Check steering actuator fluid level and fill if necessary. See Section 5, Maintenance .
	Contact your Authorized Cummins MerCruiser Diesel Repair Facility.

Symptom	Remedy
Steering wheel turned past end stop.	Key off and key on to restore steering wheel self-centering, cruise control, and to eliminate fault code.

Trim Tabs

Symptom	Remedy
Automatic trim tabs not working.	Turn off the trim tab override switch.
	Check steering actuator fluid level and fill if necessary. See Section 5, Maintenance .
	Contact your Authorized Cummins MerCruiser Diesel Repair Facility.
Automatic trim tabs working, but erratic.	Check steering actuator fluid level and fill if necessary. See Section 5, Maintenance .
	Contact your Authorized Cummins MerCruiser Diesel Repair Facility.

Boat Response Changes

Symptom	Remedy
Boat response sluggish	Check that both engines are on and functioning properly. Restart stopped engine.
	Check VesselView for fault codes.
	Check fuel quality.
	Check and drain the water separating fuel filter.
Boat vibrates or is slow to respond following a noise or impact.	1. Shut down engines and check for damage in the engine room. 2. Check in the engine room or under the boat for damage to the drives. 3. Return to dock at reduced speed. 4. Contact your Authorized Cummins MerCruiser Diesel Repair Facility if impact damage is found or suspected.
	1. Shut down engines. 2. Turn off and remove keys. 3. Check propellers for damage. If damaged, return to your Cummins MerCruiser Diesel Authorized Repair Facility for repair or replacement

Battery Will Not Charge

Possible Cause	Remedy
Excessive current draw from battery.	Turn off non-essential accessories, like the air conditioning and hot water heater.
Loose or dirty electrical connections or damaged wiring.	Check all associated electrical connections and wires (especially battery cables). Clean and tighten faulty connections. Repair or replace damaged wiring.
	Ensure area around the ground connections is clean and making good metal-to-metal contact.
Alternator drive belt loose or in poor condition.	Replace or adjust belt.
Unacceptable battery condition.	Test battery.
Battery charge switch off	Turn the battery charge switch on.

Section 7 - Troubleshooting

Possible Cause	Remedy
Shore power not on	Check the condition of the connections, cables, and shore power supply. Repair or replace as necessary.

Gauges and Instrumentation

Possible Cause	Remedy
Gauges not working	Key off and key on.
	Contact your Authorized Cummins MerCruiser Diesel Repair Facility.

Section 8 - Customer Assistance Information

Table of Contents

Owner Service Assistance.....	112	Muut kielet	114
Local Repair Service	112	Autres langues	114
Service Away From Home	112	Andere Sprachen	114
Stolen Power Package	112	Altre lingue	114
Attention Required After Submersion	112	Andre språk	114
Replacement Service Parts	112	Outros Idiomas	114
Parts and Accessories Inquiries	113	Otros idiomas	115
Resolving a Problem	113	Andra språk	115
Customer Service Literature.....	113	Allej glpssej	115
English Language	113	Ordering Literature.....	115
Other Languages	114	United States and Canada	115
Andre sprog	114	Outside The United States and Canada	115
Andere talen	114		

Owner Service Assistance

Local Repair Service

Always return your Cummins MerCruiser Diesel (CMD) powered boat to your authorized dealer/distributor should the need for service arise. Only the dealer/distributor has the factory-trained mechanics, knowledge, special tools and equipment, and the genuine Cummins/Mercury Marine parts and accessories to properly service your engine and drive should the need occur. They know your engine and drive best. Contact 1-800-DIESELS to locate your closest distributor.

Service Away From Home

If you are away from your local dealer and the need arises for service, contact the nearest Cummins MerCruiser Diesel Authorized Repair Facility. Refer to the Yellow Pages of the telephone directory or by using the service locator on the Cummins MerCruiser Diesel website (www.cmdmarine.com). If, for any reason, you cannot obtain service, contact the nearest Regional Service Center. Outside the United States and Canada, contact the nearest Marine Power International Service Center.

Stolen Power Package

If your power package is stolen, immediately advise the local authorities and Cummins MerCruiser Diesel of the model and serial numbers and to whom the recovery is to be reported. This information about the stolen motor is placed into a file at Cummins MerCruiser Diesel to aid authorities and dealers and distributors in the recovery of stolen motors.

Attention Required After Submersion

1. Before recovery, contact a Cummins MerCruiser Diesel Authorized Repair Facility.
2. After recovery, immediate service by a Cummins MerCruiser Diesel Authorized Repair Facility is required to prevent serious damage to power package.

Replacement Service Parts

WARNING

Avoid fire or explosion hazard. Electrical, ignition, and fuel system components on Cummins MerCruiser Diesel products comply with U.S. Coast Guard rules to minimize risk of fire or explosion. Do not use replacement electrical or fuel system components that do not comply with these rules. When servicing the electrical and fuel systems, properly install and tighten all components.

Marine engines are expected to operate at or near full throttle for most of their life. They are also expected to operate in both fresh and saltwater environments. These conditions require numerous special parts. Exercise care when replacing marine engine parts, as specifications are quite different from those of the standard automotive engine.

Since marine engines must be capable of running at or near maximum RPM much of the time, special pistons, camshafts, and other heavy-duty moving parts are required for long life and peak performance.

These are but a few of the many special modifications that are required in Cummins MerCruiser Diesel marine engines to provide long life and dependable performance.

Parts and Accessories Inquiries

All inquiries concerning Quicksilver replacement parts and accessories should be directed to your local authorized dealer. The dealer has the necessary information to order parts and accessories for you if he does not have them in stock. Only authorized dealers can purchase genuine Quicksilver parts and accessories from the factory. Cummins MerCruiser Diesel does not sell to unauthorized dealers or retail customers. When inquiring on parts and accessories, the dealer requires the engine model and serial numbers to order the correct parts.

Resolving a Problem

Satisfaction with your Cummins MerCruiser Diesel product is very important to your dealer and to us. If you ever have a problem, question, or concern about your power package, contact your Cummins MerCruiser Diesel Authorized Repair Facility. If additional assistance is required, take these steps:

1. Talk with the dealership's sales manager or service manager. If this has already been done, then contact the owner of the dealership.
2. If you have a question, concern, or problem that cannot be resolved by your dealership, please contact your local distributor of Cummins MerCruiser Diesel products for assistance. The distributor will work with you and your dealership to resolve all problems.

The service office will need the following information:

- Your name and address
- Daytime telephone number
- Model and serial numbers for your power package
- The name and address of your dealership
- The nature of the problem

To find the distributor for your area, use the service locator on the Cummins MerCruiser Diesel website (www.cmdmarine.com) or contact CMD sales or service listed in the yellow pages of the telephone directory. Contact 1-800-DIESELS to locate your closest distributor.

Customer Service Literature

English Language

English language publications are available from:

Mercury Marine
Attn: Publications Department
W6250 West Pioneer Road
P.O. Box 1939
Fond du Lac, WI 54935-1939

Outside the United States and Canada, contact the nearest Mercury Marine or Marine Power International Service Center for further information.

When ordering be sure to:

- List your product, model, year and serial numbers.
- Check the literature and quantities you want.
- Enclose full remittance in check or money order (NO COD).

Other Languages

To obtain an Operation, Maintenance and Warranty Manual in another language, contact the nearest Mercury Marine or Marine Power International Service Center for information. A list of part numbers for other languages is provided with your power package.

Andre sprog

Kontakt det nærmeste Mercury Marine eller Marine Power International servicecenter for oplysninger om hvordan du kan anskaffe en Betjenings- og vedligeholdelsesmanual på et andet sprog. En liste med reservedelsnumre for andre sprog leveres sammen med din power-pakke.

Andere talen

Voor het verkrijgen van een Handleiding voor gebruik en onderhoud in andere talen dient u contact op te nemen met het dichtstbijzijnde internationale servicecentrum van Mercury Marine of Marine Power voor informatie hierover. Een lijst met onderdeelnummers voor andere talen wordt bij uw motorinstallatie geleverd.

Muut kieleet

Saadaksesi Käyttö- ja huolto-ohjekirjoja muilla kielillä, ota yhteys lähimpään Mercury Marine tai Marine Power International huoltokeskukseen, josta saat lähempiä tietoja. Moottorisi mukana seuraa monikielinen varaosanumeroluettelo.

Autres langues

Pour obtenir un Manuel d'utilisation et d'entretien dans une autre langue, contactez le centre de service après-vente international Mercury Marine ou Marine Power le plus proche pour toute information. Une liste des numéros de pièces en d'autres langues accompagne votre bloc-moteur.

Andere Sprachen

Um eine Betriebs- und Wartungsanleitung in einer anderen Sprache zu erhalten, wenden Sie sich an das nächste Mercury Marine oder Marine Power International Service Center. Eine Liste mit Teilenummern für Fremdsprachen ist im Lieferumfang Ihres Motors enthalten.

Altre lingue

Per ottenere il manuale di funzionamento e manutenzione in altra lingua, contattate il centro assistenza internazionale Mercury Marine o Marine Power più vicino. In dotazione con il gruppo motore, viene fornito l'elenco dei codici prodotto dei componenti venduti all'estero.

Andre språk

Ytterligere informasjon om bruks- og vedlikeholdshåndbok på andre språk kan fås ved henvendelse til nærmeste internasjonale servicecenter for Mercury Marine eller Marine Power. En liste over delenumre for andre språk følger med aggregatet.

Outros Idiomas

Para obter um Manual de Operação e Manutenção em outro idioma, contate o Centro de Serviço Internacional de Marine Power" (Potência Marinha) ou a Mercury Marine mais próxima para obter informações. Uma lista de números de referência para outros idiomas é fornecida com o seu pacote de propulsão.

Otros idiomas

Para obtener un Manual de operación y mantenimiento en otro idioma, póngase en contacto con el centro de servicio más cercano de Mercury Marine o Marine Power International para recibir información. Con su conjunto motriz se entrega una lista de los números de pieza para los otros idiomas.

Andra språk

För att få Instruktions- och underhållsböcker på andra språk, kontakta närmaste Mercury Marine eller Marine Power International servicecenter, som kan ge ytterligare information. En förteckning över artikelnummer på andra språk medföljer ditt kraftpaket.

Allej glpssej

Gia na apoktþsete Ýna Egxeirðdio Leitourgðaj kai Suntþrhshj se Üllh glþssa, epikoinwnþste me to plhsiÝstero DieqnÝj KÝntro SÝrbij thj Mercury Marine þ thj Marine Power gia plhroforðej. To pakÝto isxýoj saj sunodeýetai apü Ýnan katÜlogo ariqmþn paraggeiðaj gia Üllej glþssej.

Ordering Literature

Before ordering literature, please have the following information about your power package available:

Model		Serial Number	
Horsepower		Year	

United States and Canada

For additional literature about for your particular Cummins MerCruiser Diesel power package, contact your nearest Cummins MerCruiser Diesel dealer/distributor or contact:

Mercury Marine		
Telephone	Fax	Mail
(920) 929-5110 (USA Only)	(920) 929-4894 (USA Only)	Mercury Marine Attn: Publications Department P.O. Box 1939 Fond du Lac, WI 54935-1939

Outside The United States and Canada

Contact your nearest authorized Cummins MerCruiser Diesel dealer/distributor or Marine Power Service Center to order additional literature that is available for your particular Cummins MerCruiser Diesel power package.

Please submit the following order form with payment to:	Mercury Marine Attn: Publications Department W6250 West Pioneer Road P.O. Box 1939 Fond du Lac, WI 54936-1939
Ship To: (Please copy this form and print or type—This is your shipping label)	
Name	
Address	
City, State, Province	
ZIP or postal code	
Country	

Section 8 - Customer Assistance Information

Quantity	Item	Stock Number	Price	Total
			.	.
			.	.
			.	.
			.	.
			.	.
	Total Due		.	.